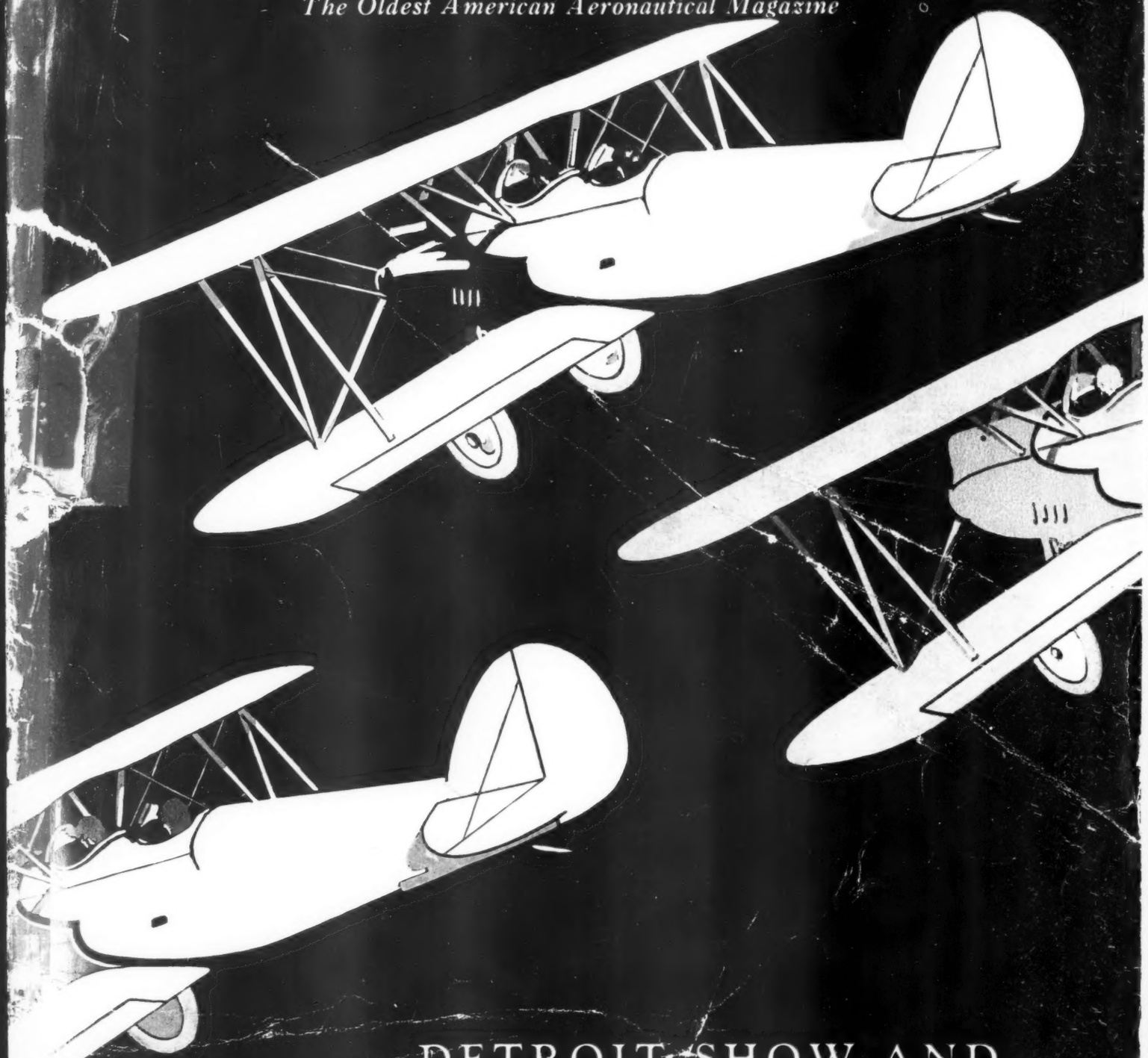
April 5, 1930 A McGraw-Hill Publication 25 Cents per Copy

AVIATION

The Oldest American Aeronautical Magazine



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AVIATION

The Oldest American Aeronautical Magazine

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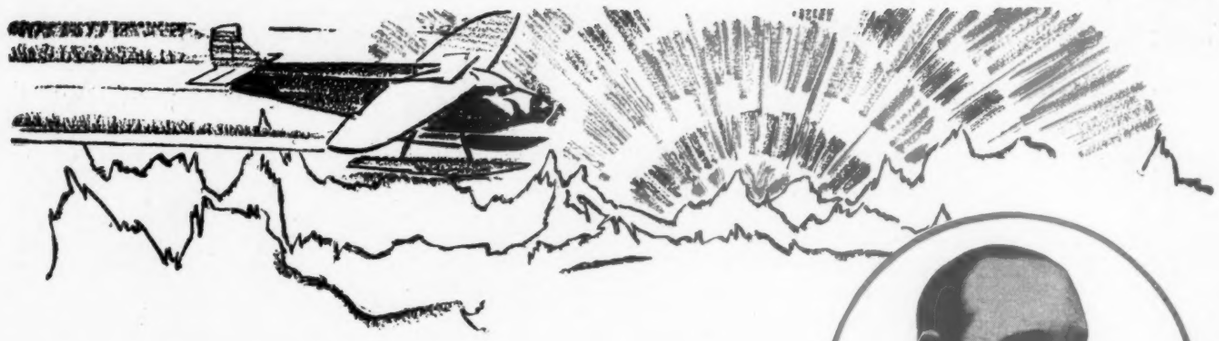

Captain Wilkins cables:

"MOBILOIL SERVED US PERFECTLY...
NOTHING BETTER..."

after 2500 miles of Antarctic flying

Captain Sir Hubert Wilkins, who has just completed another of his Antarctic expeditions in the interests of science and aviation, has cabled the Vacuum Oil Company as follows:

"Mobiloil served us perfectly in all our Antarctic flying. Nothing better."

Captain Wilkins' Lockheed Vega plane has flown over 2500 miles of formerly unknown barren wastes in the far South. Several new islands and over 300 miles of new coast line have been added to world maps this year by the Wilkins-Hearst Antarctic explorations.

During the first Antarctic flight in history, Captain Wilkins discovered a large harbor which he named Mobiloil Bay, "to commemorate the excellent service rendered to aviation and to our expedition by Mobiloil."

Captain Wilkins' achievements are significant additions to the proved performances of "Double-Range" Mobiloil Aero Oils. When dependable lubrication was absolutely necessary, these lubricants have repeatedly demonstrated their worth.

The same "Double-Range" Mobiloil Aero Oils used by Captain Wilkins are on sale at established airports throughout the world.

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Makers of high-quality lubricants for all types of machinery

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FOR ROCKER-ARM LUBRICATION USE MOBILGREASE

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Sioux offers you the finest Aeroplane Reamer Equipment

Sioux Aeroplane Reamers are made of a special alloy tool steel which stands up and holds its cutting edge in the severe work of cutting the bronze valve seats used on most aeroplane motors. They are also made left handed so the tool can be turned to the right. Made in 30° and 45° finishing and roughing, 15° narrowing in finishing type and 75° narrowing in finishing type.

The Special Sioux Pilot and Sioux Feed Screw

assure precision work with minimum effort. When the Feed is screwed up it brings the reamer against the valve seat. A simple, positive arrangement keeps the reamer teeth beneath the surface of the metal, preventing the reamer from sliding over the glazed surface. Sioux Feed Screws are so designed that only two are needed for the various makes of aeroplane motors.

Your Jobber Sells Them

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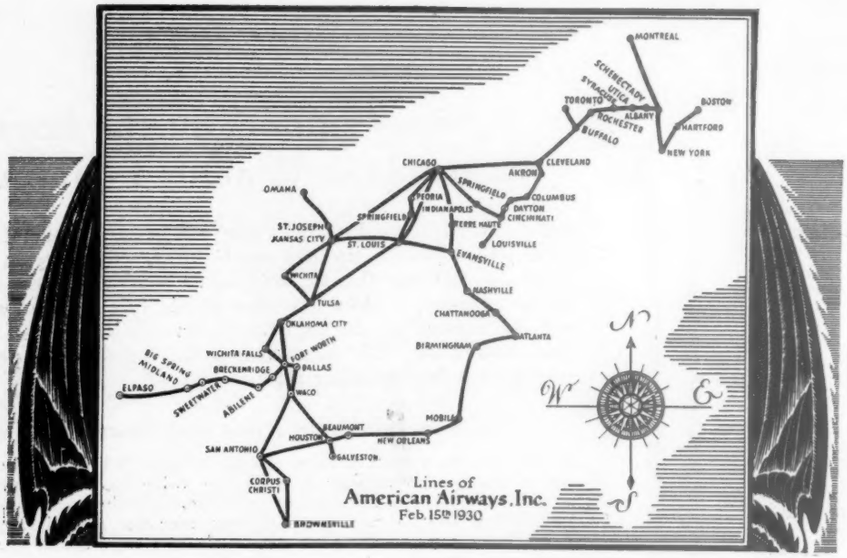
FOR AEROPLANE MOTORS

Where the World's Largest Air Transportation . . . GETS



by **GLENN OGLE**
Employment Manager
of
Universal Aviation Schools

If you wonder what aviation can offer you, stop and consider the number of pilots, mechanics, welders, executives, salesmen, radio operators, service men, traffic men, accountants, cashiers, clerks, and others needed to operate a large air transportation system. Roughly, you can figure that for every pilot 40 non-flying men are required.

Scope of American Airways, Inc. . . . . .

Notice the map above which shows the territory over which planes are being operated on regular daily schedule by the American Airways, Inc., the world's largest air transportation system and the organization of which Universal Aviation Schools are a division.

New routes are being added from time to time, each one of which demands more men with aviation training. Aviation's problem is to train men fast enough to fill the positions constantly being opened.

How Men Are Selected . . .

As employment manager of Universal Aviation Schools, I am constantly being called upon for men of all qualifications. With my file of applications before me, I select the type of man who seems best fitted to fill the requirements of the position open. A man's past experience is very important. Aviation training is absolutely essential and the source of that training must be reliable.

Universal Aviation

UNIVERSAL AVIATION SCHOOLS

A DIVISION OF AMERICAN

Operating Company of The Aviation

A NATIONAL SYSTEM OF U. S. GOVERNMENT

System of ITS MEN . . . . .

It is on this basis I am placing many men in aviation.

Why Universal Trained Students Get Preference . . .

This service is not limited to graduates of Universal Aviation Schools, but Universal graduates receive first consideration, and other things being equal, are given first opportunity.

An important reason for this is that we have accurate check on their qualifications, including not only their references, previous employment, education, etc., but also first-hand knowledge of their grades, industry, dependability, personality, and character. From experience, other large aviation companies have learned to place confidence in Universal trained men.

Facts About Universal Aviation Schools

Universal Aviation Schools are located in a number of principal cities in the United States. Each school has been inspected, rated and approved by the United States Department of Commerce. This is the highest recommendation any aviation school can have.

Training is necessarily thorough. Equipment is complete, in keeping with the magnitude of the whole organization. Instructors are seasoned veterans who have passed all Department of Commerce examinations. The Universal graduate invariably makes good—he must be good to graduate.

What Position Do You Want? . . .

We are training a special group of young men this summer for positions with American Airways, Inc. If you are interested in establishing yourself in this new industry, with us or with others, give us the information asked for in the coupon at the right.

I will personally look over your past experience and advise you without obligation just what training you should have and whether your qualifications meet our requirements.

Glenn Ogle

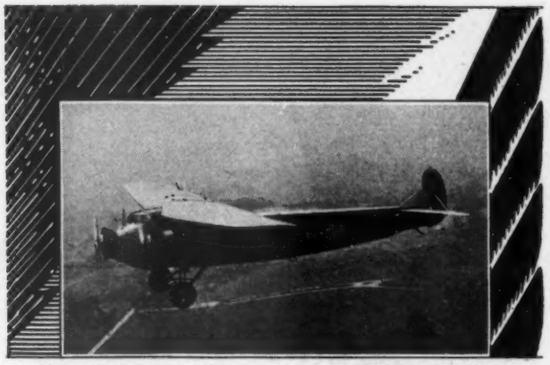
Employment Manager

Schools

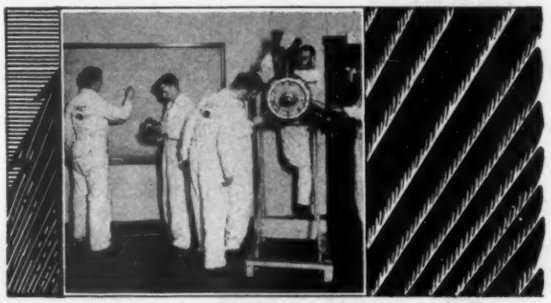
AIRWAYS, Inc.

Corporation

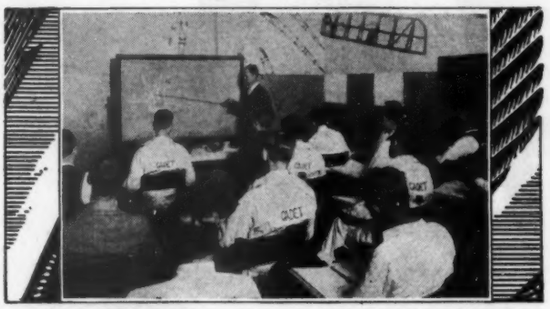
A P P R O V E D S C H O O L S



"Student" transport pilots are given a minimum of 10 hours training on tri-motored planes.



Shop instruction includes actual work on latest type airplane motors and aircraft.



Class-room lectures cover every phase of aviation theory.

INFORMATION BLANK

FILL IN AND MAIL

Mr. Glenn Ogle, Employment Manager,
UNIVERSAL AVIATION SCHOOLS,
1052-61 Boatmen's Bank Bldg.,
St. Louis, Mo.

Please advise me what training I should take.

I prefer position as Pilot.....,

Mechanic....., Welder....., Office work.....
(check which)

Name.....*Age*.....

Address.....

City.....*State*.....

Telephone Number.....

My past experience is.....

.....

.....

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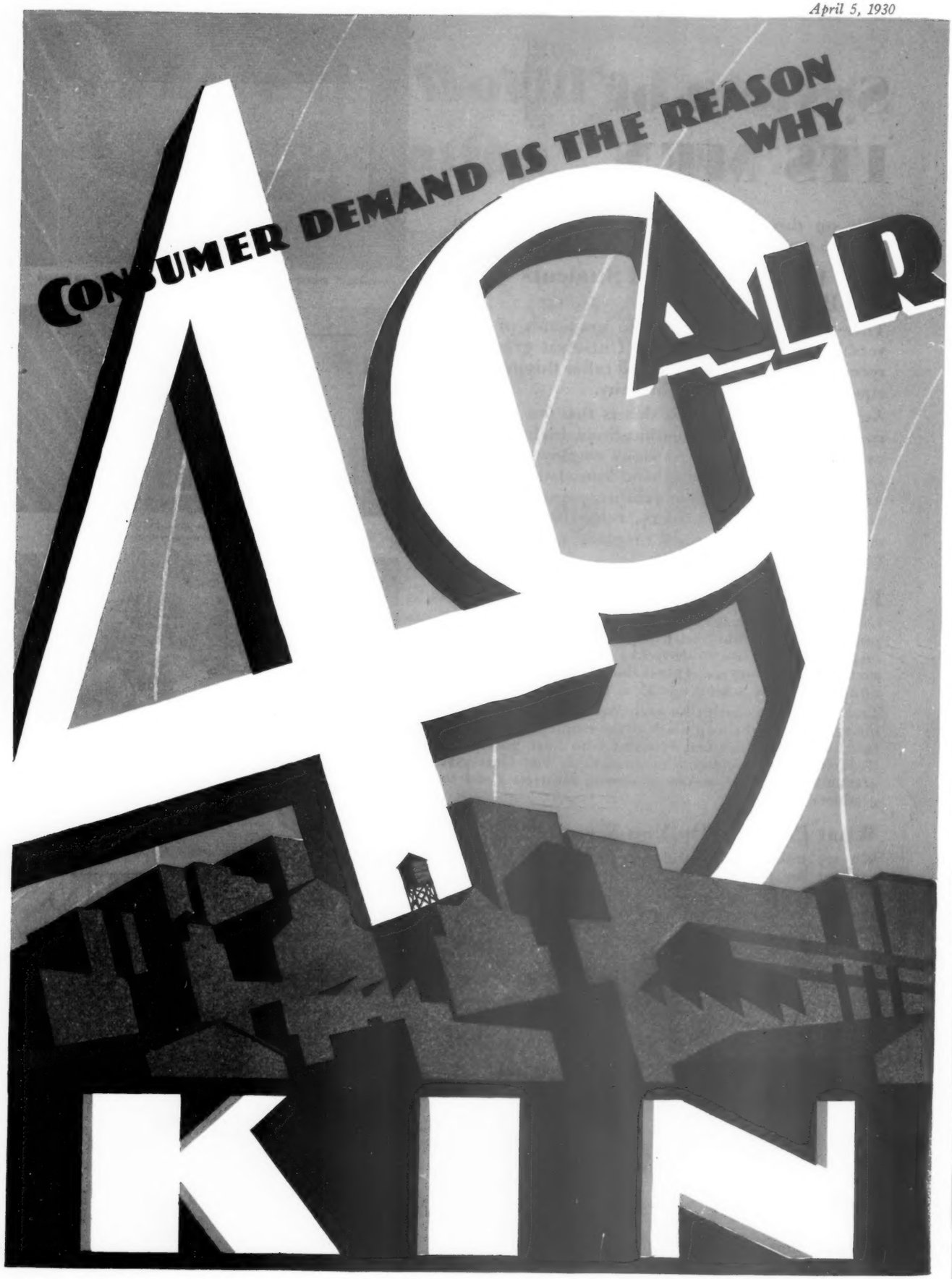
01


CONSUMER DEMAND IS THE REASON WHY
AIR
KIN

PLANE
MANUFACTURERS
POWERED THEIR PLANES
WITH KINNER IN 1929.
KINNER AIRPLANE & MOTOR CORP.
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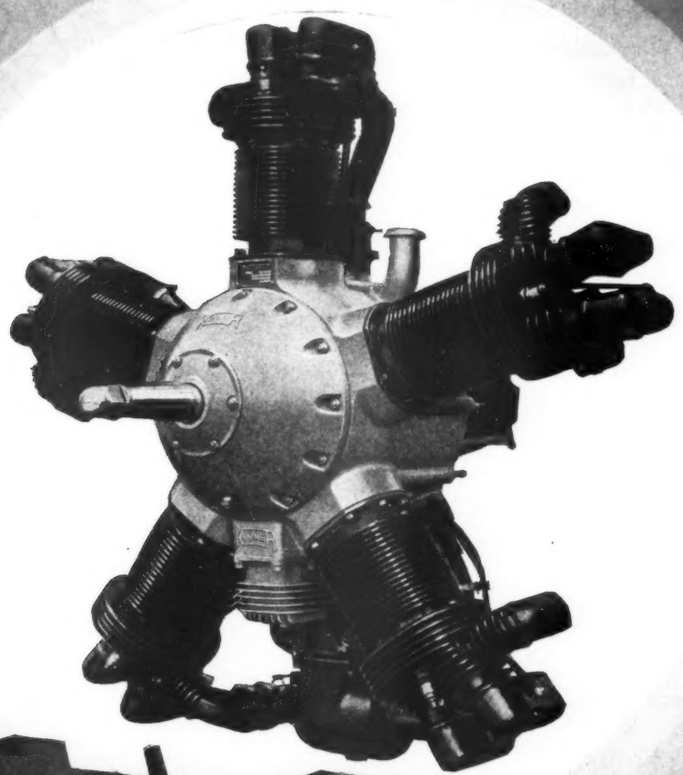


NER

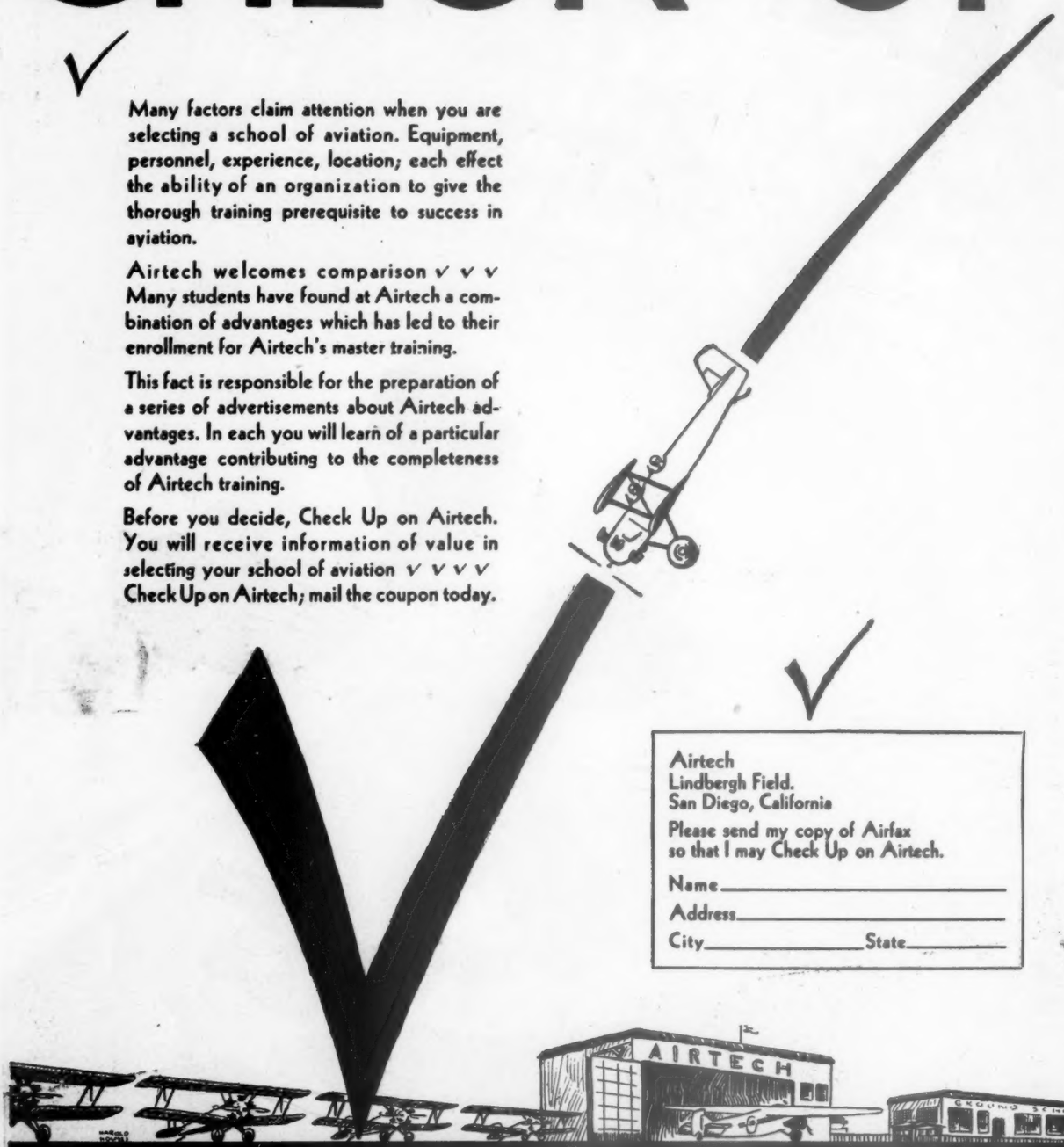
CHECK UP

Many factors claim attention when you are selecting a school of aviation. Equipment, personnel, experience, location; each effect the ability of an organization to give the thorough training prerequisite to success in aviation.

Airtech welcomes comparison ✓ ✓ ✓
Many students have found at Airtech a combination of advantages which has led to their enrollment for Airtech's master training.

This fact is responsible for the preparation of a series of advertisements about Airtech advantages. In each you will learn of a particular advantage contributing to the completeness of Airtech training.

Before you decide, Check Up on Airtech. You will receive information of value in selecting your school of aviation ✓ ✓ ✓ ✓
Check Up on Airtech; mail the coupon today.



Airtech
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San Diego, California

Please send my copy of Airfax
so that I may Check Up on Airtech.

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Address_____

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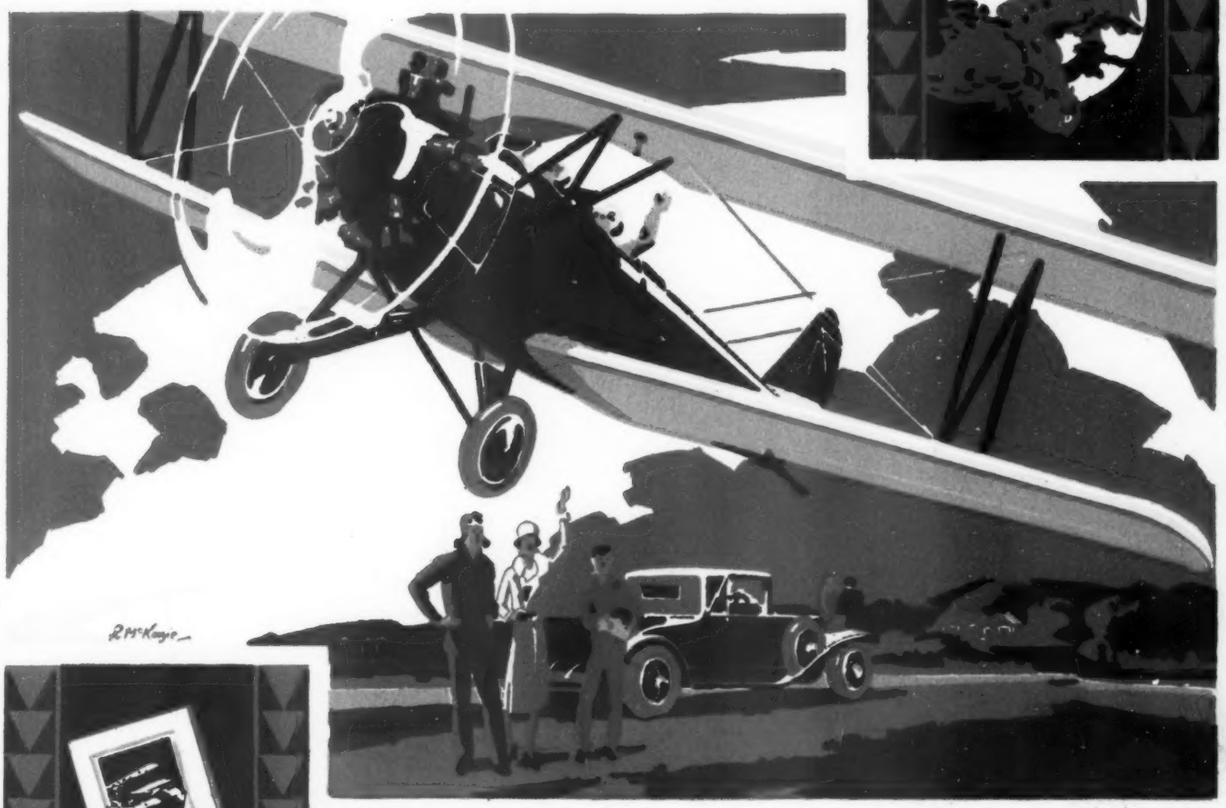
AIRTECH

LINDBERGH FIELD SAN DIEGO

THE CHOICE OF BOTH STUDENT AND VETERAN FLYERS



A request by mail will bring you a copy of "How To Judge An Airplane"—a unique—informative—interesting Booklet.

WITH a responsiveness to the controls that make plane and pilot one . . . The FLEET imparts to the student flyer confidence in himself—a most vital part of his early training. To the veteran pilot, this inherent quality of The FLEET means complete mastery . . . the triumph of wings—space, speed and security » » » With its low air-hour cost . . . its minimum of ground maintenance . . . its strength that means safety in the air, and its consequent popularity with both students and instructors—The FLEET has become the standard training plane throughout the Western Hemisphere.

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THAT PAY PROFITS

DESIGNED to increase the flexibility of air transport operation, The FLEETSTER — with a useful load of 2,000 pounds and a cruising range of 400 miles at 145 miles an hour—meets perfectly the steadily increasing demand for a dependable plane which will carry pay loads that pay profits » » » Six Fleetsters, serving the New York, Rio & Buenos Aires Line Inc. in expediting mail and passenger traffic from South American seaports to inland stations, are exceeding all expectations » » » Regardless of geography or topography, transport operators will find in The FLEETSTER that one type of plane which can be relied upon to fulfill whatever mission it attempts—economically and thereby profitably. A request on your business stationery will bring you complete details.

THE FLEETSTER

CONSOLIDATED AIRCRAFT CORPORATION

Buffalo New York

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Now Centers HERE!

No snow, no sleet, no ice, no winter blizzards to interrupt flying or slow down production.

Average velocity of wind, 5 M.P.H.

55 Airports and Landing Fields.

More Licensed Pilots than in any other County in the United States.

Adequate supply of skilled expert labor.

25, or more, aviation schools now training over 2500 students.

Low Building Costs.

Hydro-electric power, natural gas and fuel oil, and abundant water... all at low cost.

Ideal Labor and Living Conditions.

Leading manufacturers of aircraft, airplane motors, parts, and equipment, who are making history in the aviation industry today, now have either major or branch plants in Los Angeles County.

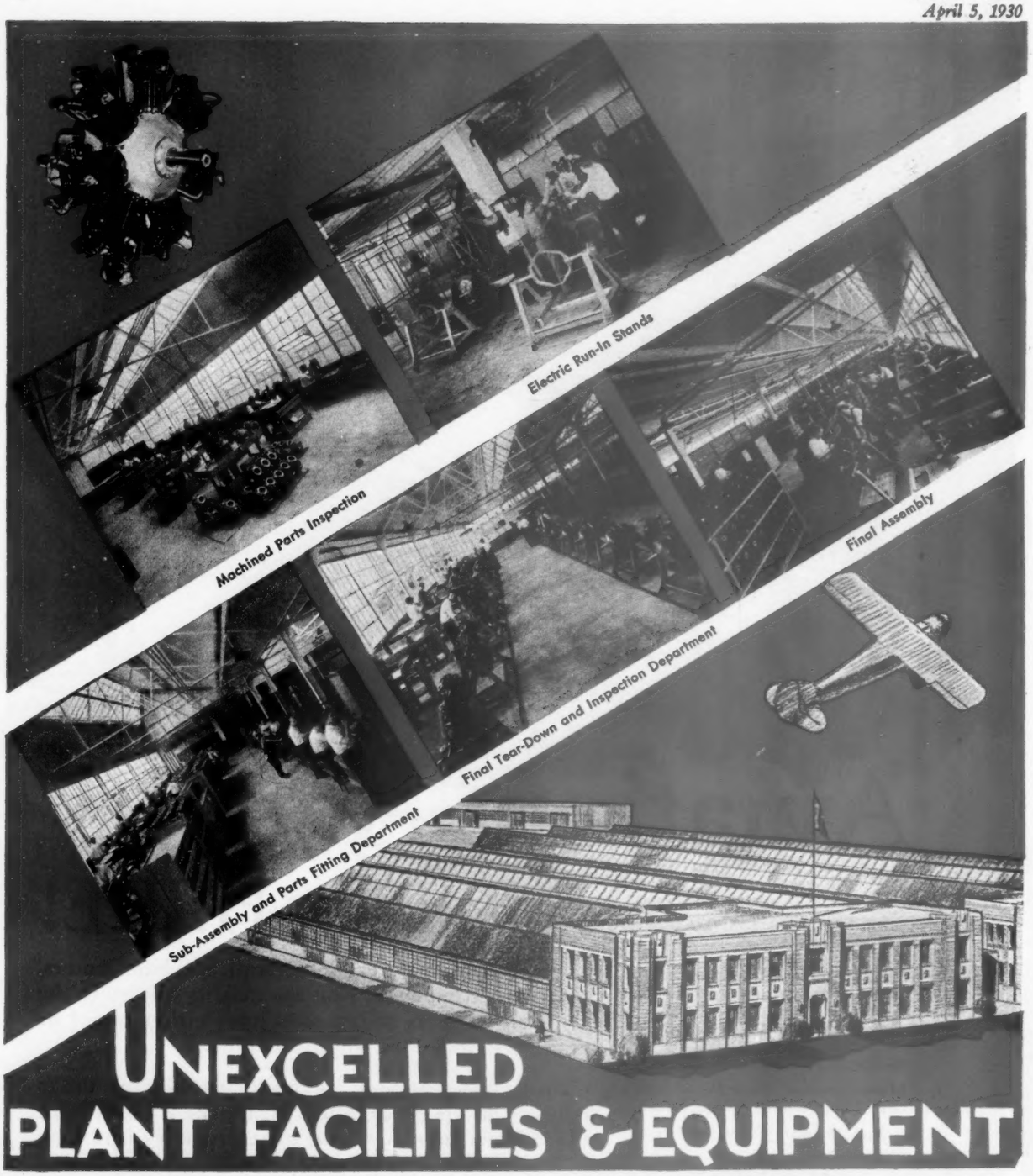
Climatic and general flying conditions favorable to the industry and peculiar to this area make it possible for the manufacturer to operate more profitably here than in less-favored sections.

The aviation center of America is already established in Los Angeles County and the greater development of the future is bound to occur here.

Manufacturers who are interested in facts pertaining to the aircraft industry and its opportunities in Los Angeles County, are invited to communicate with the Industrial Department of the Los Angeles Chamber of Commerce.

Air-Minded

LOS ANGELES COUNTY



UNEXCELLED PLANT FACILITIES & EQUIPMENT

We are, and we believe with the very best of reasons, exceedingly proud of the very excellent facilities for production afforded in the home of the Warner Scarab Series 30, and the Warner Scarab Junior.

From the rough casting inspection through the various processes of machining, fitting, assembling, on through to the electric motor run-in stands and the test sheds with their laboratory equipment of the most recent design, no step has been overlooked that will assure the very finest kind of performance in those Warner engines.

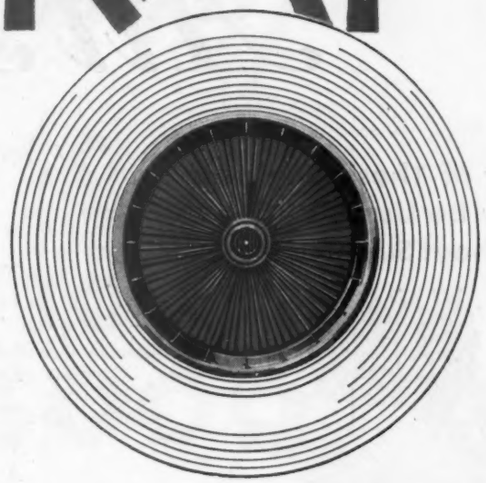
The new Warner Junior 5 Cylinder engine just announced, will, we confidently believe, equal in its sphere the very valuable contributions already made to American Aircraft history by the Warner Series 30, Seven Cylinder.

Pamphlets illustrating both of these and giving their structural details at considerable length are available. Write for them.

WARNER AIRCRAFT CORPORATION
DETROIT, MICHIGAN

WARNER "*Scarab*" ENGINES

AIRCRAFT



LANDING

Popular with aircraft manufacturers and pilots because of their inherent strength designed in by men who know aeronautical requirements.

Aircraft Division

KELSEY-HAYES WHEEL CORPORATION

Detroit Michigan

Affiliated Divisions:

Kelsey Wheel Company, Ltd., Windsor, Ont.
Wire Wheel Corp. of America, Buffalo, N. Y.
Kelsey Wheel Co. Inc., Memphis, Tenn.

KELSEY-HAYES

WHEELS

The TWENTY FIVE *All America*

{Sanctioned by The National Aeronautic Association}

The world's greatest race over the air lanes of three nations.

$25,000 in prizes already deposited in escrow by American Cirrus Engines, Inc., associates of Allied Motor Industries, Inc.

Open to all pilots flying ships equipped with American Cirrus Engines or American Hi-Drive Ensign Engines.

The flight of more than 7500 miles will start and finish in New York. Down the eastern seaboard the contestants will go. Across old Mexico their shadows will sweep. Sunny California valleys will smile up at them. The old world hospitality of Canada will welcome them. Glory, adventure and rich rewards will await them at the end of their journey.

A racking test of airmanship and plane and motor construction.

A challenge to American fliers and to American plane designers and builders.

Yet American Cirrus Engines, Inc. offers its prize in confidence that the challenge will be met, the test survived and the development of aviation in this country given such renewed impetus as it has not received since Col. Chas. Lindbergh dropped into Le Bourget Field at Paris at the end of his non-stop flight from New York.

In fact, the purpose of this race is to promote aviation by increasing public interest in flying as a means of transportation, and by demonstrating the power, reliability and safety of moderately priced aircraft.

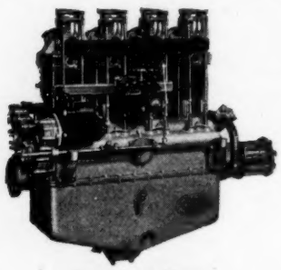
To the flier, the race offers the opportunity of winning personal glory and renown as well as a substantial pecuniary reward.

To the plane designer and manufacturer it offers the opportunity of proving his product before the public in a manner not only spectacular and thrilling but, above all else, convincing.

At the left are shown the three types of engines with any of which competing planes may be equipped.

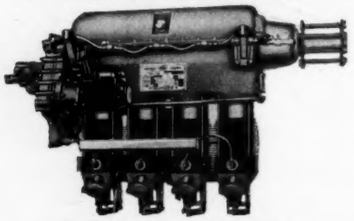
Wire or write today for full information as to entry requirements and rules and regulations of this record-breaking race.

Any of These Engines May Be Used, With or Without Supercharger



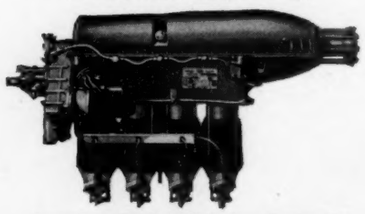
American Cirrus

Without Supercharger: Horsepower 95, Weight 275 lbs.; *With Supercharger:* Horsepower 115, Weight 320 lbs., R. P. M. 2100.



American Ensign Hi-Drive

Without Supercharger: Horsepower 95, Weight 272 lbs.; *With Supercharger:* Horsepower 115, Weight 320 lbs. R. P. M. 2100.



American Ensign Hi-Drive, Geared

Engine Speed 2100. Propeller Speed 1260. *Without Supercharger:* Horsepower 95, Weight 298 lbs; *With Supercharger:* Horsepower 115, Weight 345 lbs.

DePalma Supercharger

Positive Pressure Type. Made by American Cirrus. Available on Any of Three Engines Shown. Driven at Crankshaft Speed. Mounts on Rear End of Crankcase.

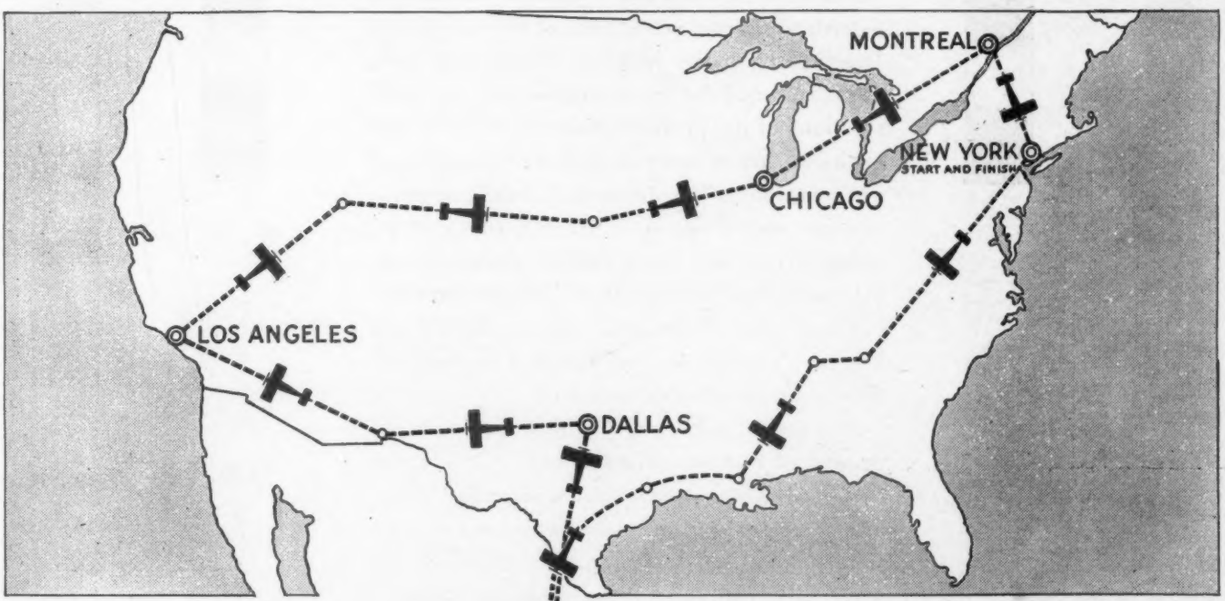
AMERICAN CIRRUS ENGINES

THOUSAND DOLLAR

Flying Derby

First Prize.. $15,000
Second Prize $ 7,000
Third Prize $ 3,000

TOTAL $25,000



Other Facts of Importance

Starting date — about July 21st

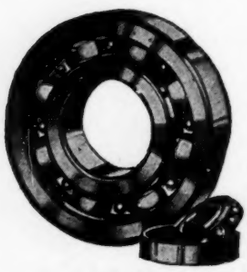
Entries Close July 7th

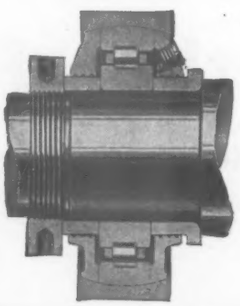
Minimum number of starters—15

Winners to be determined by total elapsed time

INCORPORATED, MARYSVILLE, MICH.

There is a PRECISION BEARING *for every* LOAD, SPEED *and* DUTY





IN the entire range of anti-friction bearing service, there is not a combination of conditions which cannot be met—economically, and with entire assurance of continued satisfaction—with some one, or several, of the PRECISION Bearings from the NORMA-HOFFMANN line.

There need be no compromise, no half-solutions of the problem, NORMA-HOFFMANN engineers are never compelled to recommend a bearing that is "good-enough". In the comprehensive and diversified NORMA-HOFFMANN range of types and sizes, there is always a bearing that is the "right bearing" for the purpose.

Think what this means, where a single problem may require several bearing applications differing in conditions and duty.

PRECISION, a *standard* which is rarely approached but never excelled, outside the NORMA-HOFFMANN factories—*standard* bearings specially applied—one undivided responsibility covering every bearing application—where else can you get the all-comprehensive value which is here represented?

Write for Catalogs 904, 917 and 921, giving complete engineering data on the* NORMA-HOFFMANN *Bearing line.

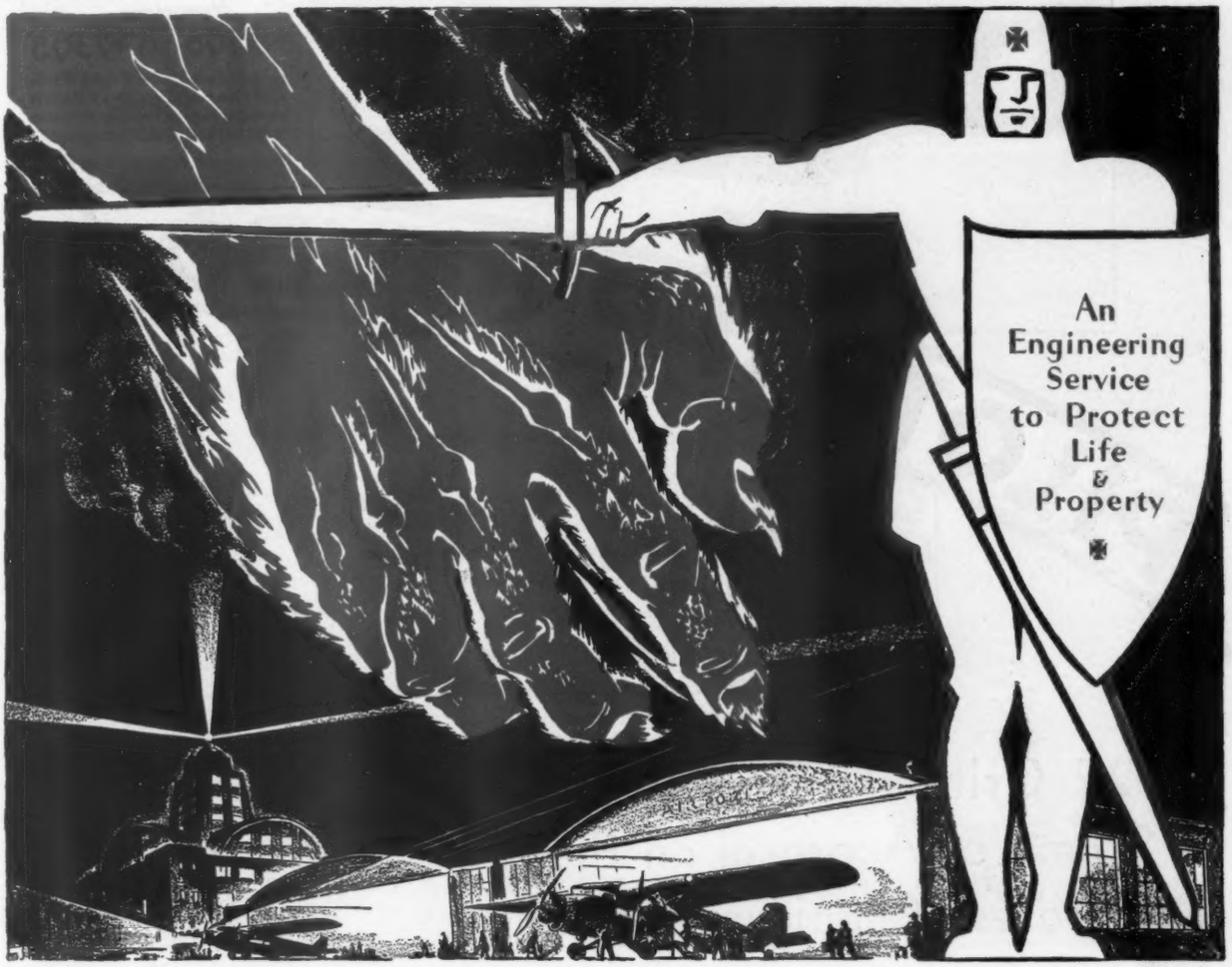
On exhibit at Booths 22-24
Patrick Airway—Detroit, Mich.

"NORMA-HOFFMANN"
PRECISION BEARINGS

N-1041

NORMA-HOFFMANN BEARINGS CORPN.- STAMFORD CONN. U.S.A.

FIRE — AN INCIDENT OR A DISASTER ?



FIRE! Give him an inch and he'll take the airport!

Fire will go the limit if you give him half a chance! There's only one sure way to check his greedy reach for your airport—correct and adequate equipment to kill Fire young.

But don't guess, for every airport, every hangar, represents a different problem. Hundreds of airports are already safeguarded by La France and Foamite Protection correctly adapted to each hazard by a careful study of that hazard. The same scientific thought and engineering skill is available to you. Not the placing of a few or a dozen extinguishers, but supplying adequate safeguards determined by facts... La France and Foamite service includes a detailed study of your airport's needs by fire protection engineers: recommendations for supplying proper and adequate fire protection, as a result of this study; instruction of your field employees as to its use, expert advice as to proper charging, maintenance, and where to locate the equipment.

A request will bring a fire protection engineer. American-La France and Foamite Corporation, Dept. T61, Elmira, N. Y. Offices in All Principal Cities.

LA FRANCE AND FOAMITE PROTECTION

AN ENGINEERING SERVICE
AGAINST FIRE

Send for booklet "Sinister Beacons" which describes fire risks common to aviation and methods of protection against them.

The Four Place Cabin Monoplane—

$6995 to $7395

Manufactured with Wright Whirlwind Five and Continental Motors under Approved Type Certificates

PILOT APPROVED.

The Three Place Biplane—Kinner Powered

$3995

Manufactured under Approved Type Certificate 293

122 Critical Fliers Place Stamp of Approval on the Greatest American Eagles

The proof of the pudding's, the eating---the proof of an airplane is in the way it flies.

At St. Louis, Lambert field, during the International Aircraft Show, 122 of America's leading pilots flew the new American Eagles---and heralded them as remarkable aircraft in every way.

The most critical jury in the world! What better indorsement would you ask?

American Eagle Aircraft Corp.,
3 Fairfax Airport,
Kansas City, Kansas.

Please send full information with descriptive literature concerning the complete line of American Eagle Airplanes.

Name .....

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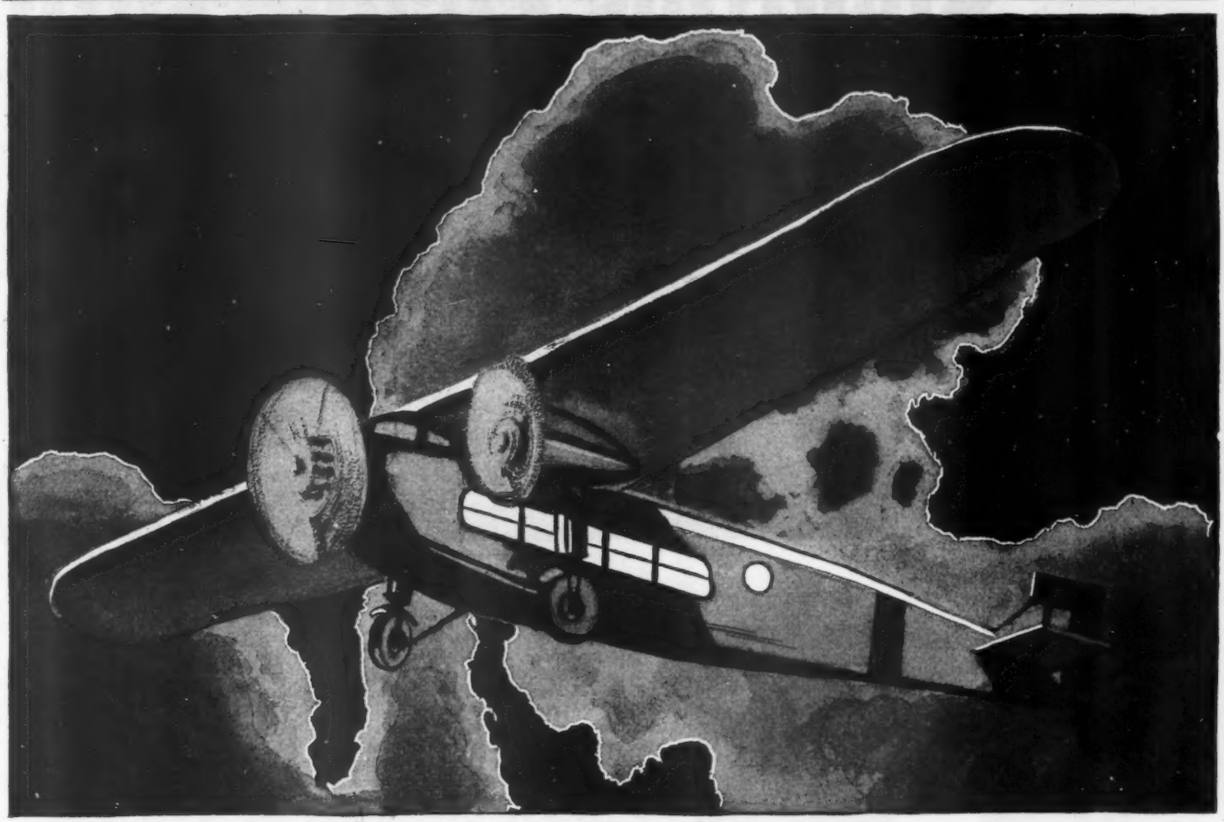
AMERICAN EAGLE

AIRCRAFT CORPORATION

FAIRFAX AIRPORT KANSAS CITY, KANS.

"MASTER OF THE SKIES"

ARMOR-LITE



Protection for Those Who Fly

ARMOR-LITE is a laminated, *scatter-proof* glass, of brilliant lustre and excellent visibility.

Armor-Lite *scatter-proof* glass has been put on the market only after extensive tests have proved it to be superior to many so called shatter-proof glasses.

Armor-Lite is available in a wide variety of sizes, weights and thicknesses . . . from heavy "Bullet-proof" for banks to "Featherweight," especially designed for the aviation industry.

Every manufacturer or operator of aircrafts will find it to his advantage to write us for further information concerning Armor-Lite. *Address* . . .

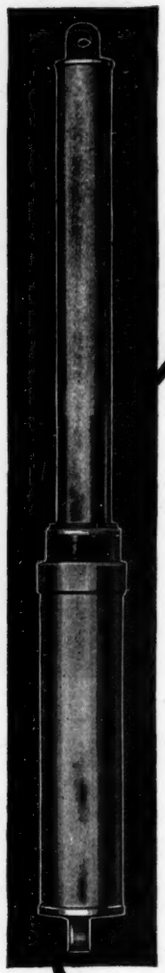
American Window Glass Company

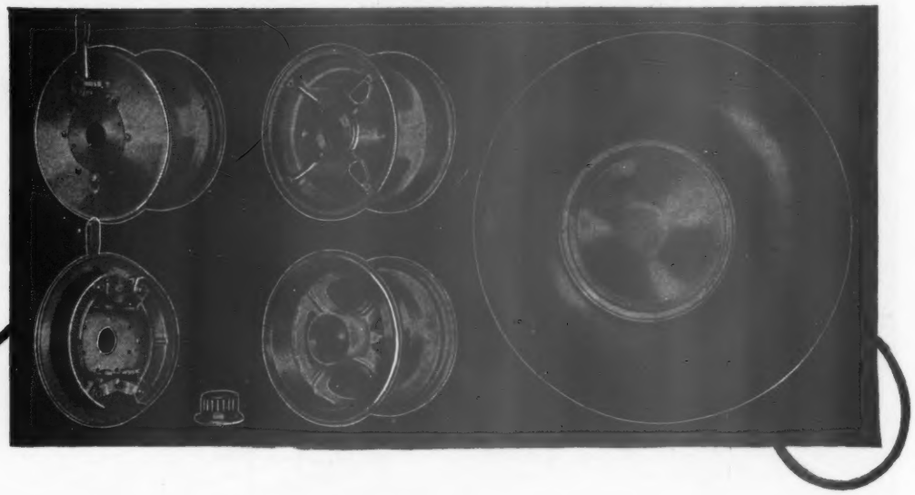
World's Largest Producer of Window Glass

Farmers Bank Building, Pittsburgh, Pennsylvania

NON-SCATTERABLE
ARMOR-LITE
AMERICAN BULLET PROOF GLASS CO.

An Acceptance that Signifies Leadership

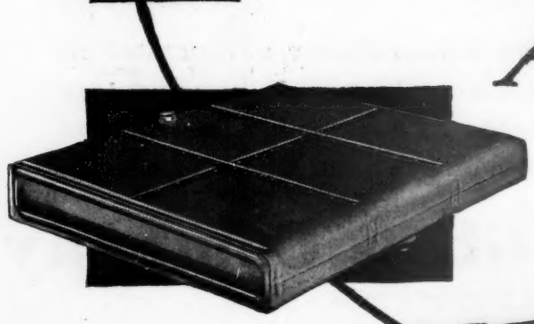




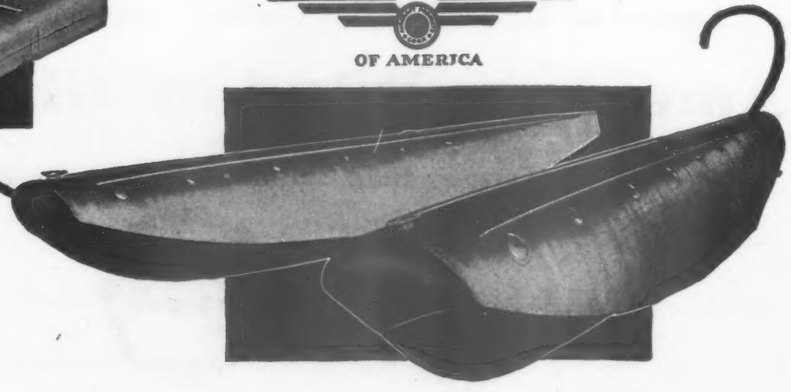
Designers and manufacturers of airplane Wheels and Brakes, Axles and Complete Undercarriages, Oildraulic Shock Struts, Tail Wheels, Pontoons, Flying Boat Hulls, Wing Tip Floats, Airplane Skids, Gasoline Tanks, Oil Tanks and Oil Coolers.

WE list here a number of our customers, all of whom have accepted our products for the various types of aircraft they produce: American Eagle Aircraft Corp., Aeromarine Klemm Corp., Bellanca Aircraft Corp., Berliner-Joyce Aircraft Corp., Cessna Aircraft Co., Command-Aire, Inc., Consolidated Aircraft Corp., Courier Monoplane Co., Inc., Crown Motor Carriage Co., Curtiss Aeroplane & Motor Co., Curtiss-Robertson Airplane Mfg. Co., Davis Aircraft Corp., Driggs Aircraft Corp., Great Lakes Aircraft Co., General Airplane Corp., Inland Aviation Co., Keystone Aircraft Corp., Lockheed Aircraft Co., Mohawk Aircraft Corp., Mono Aircraft Corp., New Standard Aircraft Corp., Nicholas-Beazley Airplane Co., Ogden Aeronautical Corp., St. Louis Car Co., Pitcairn Aircraft, Ryan Aircraft Corp., Simplex Aircraft Corp., Spartan Aircraft Co., Star Aircraft, Sikorsky Aviation Corp., The Stearman Aircraft Co., Stinson Aircraft Corp., Sullivan Aircraft Co., W. F. Stewart Co., Taylor Bros. Aircraft Corp., Timm Airplane Corp., Travel Air Co., Verville Aircraft Co., Watkins Aircraft Co., Waco Aircraft, Ford Motor Co., Bach Aircraft Co., and Crosley Aircraft Co. We invite you, also, to participate in the economies made possible through our facilities for mass production. Let us show you how the Aircraft Products Corporation fits into your manufacturing program.

AIRCRAFT PRODUCTS CORPORATION OF AMERICA,
DETROIT, MICHIGAN



Aircraft Products
CORPORATION
OF AMERICA



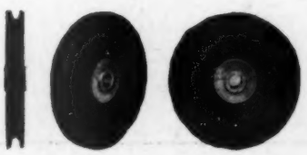
Moderate in cost

Reliable in performance

Light in weight

THE NEW G-E CARD COMPASS

GENERAL ELECTRIC announces this new card compass to meet the need for an accurate instrument at moderate cost. Its features include nonglare lighting of variable intensity; ground glass lens; and one-piece aluminum construction combining expansion chambers, spherical bowl, and compensation housing. The compass can be supplied for base, ceiling, wall, or panel mounting. The weight complete is 1.9 lb. For further information, address General Electric Company, Schenectady, N. Y.—manufacturer of airport- and airway-lighting equipment, instruments for navigation and flight, engine accessories, and sundry devices for the aëronautic industry.



The new General Electric ball-bearing control pulleys embody the experience and technique acquired in producing more than half a billion molded products. They are worthy of your immediate interest and investigation.

700-4

GENERAL ELECTRIC

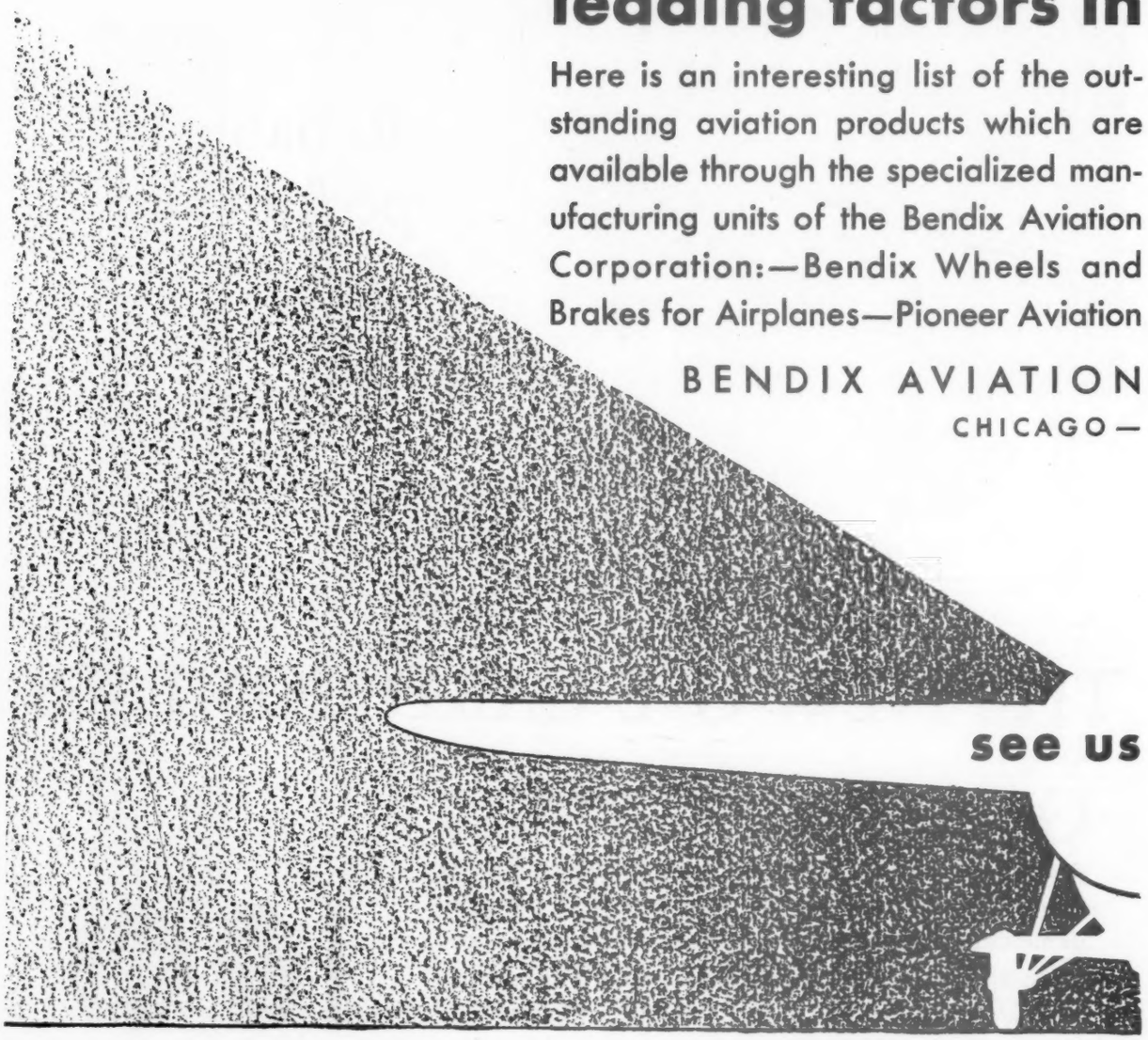
AËRONAUTIC EQUIPMENT

BENDIX

leading factors in

Here is an interesting list of the outstanding aviation products which are available through the specialized manufacturing units of the Bendix Aviation Corporation:—Bendix Wheels and Brakes for Airplanes—Pioneer Aviation

BENDIX AVIATION
CHICAGO—



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BENDIX

AVIATION

BENDIX BRAKE COMPANY, SOUTH BEND, IND.
Airplane Wheels and Brakes

BENDIX-COWDREY BRAKE TESTER, INC., SOUTH BEND, IND.
Brake Service Equipment for Aircraft

DELCO AVIATION CORPORATION, DAYTON, OHIO
Electrical Equipment for Aviation

ECLIPSE AVIATION CORPORATION, EAST ORANGE, N. J.
Aviation Engine Starters and Generators

PIONEER INSTRUMENT COMPANY, BROOKLYN, N. Y.
Aviation Instruments

SCINTILLA MAGNETO COMPANY, SIDNEY, N. Y.
Magnetos for Airplanes

STROMBERG MOTOR DEVICES COMPANY, CHICAGO, ILL.
Aviation Carburetors

STROMBERG RESEARCH CORPORATION, CHICAGO, ILL.
Aviation Development

AMERICAN PROPELLER COMPANY, Airplane Propellers

FOREIGN

BENDIX BRAKES, LTD., TORONTO, CANADA

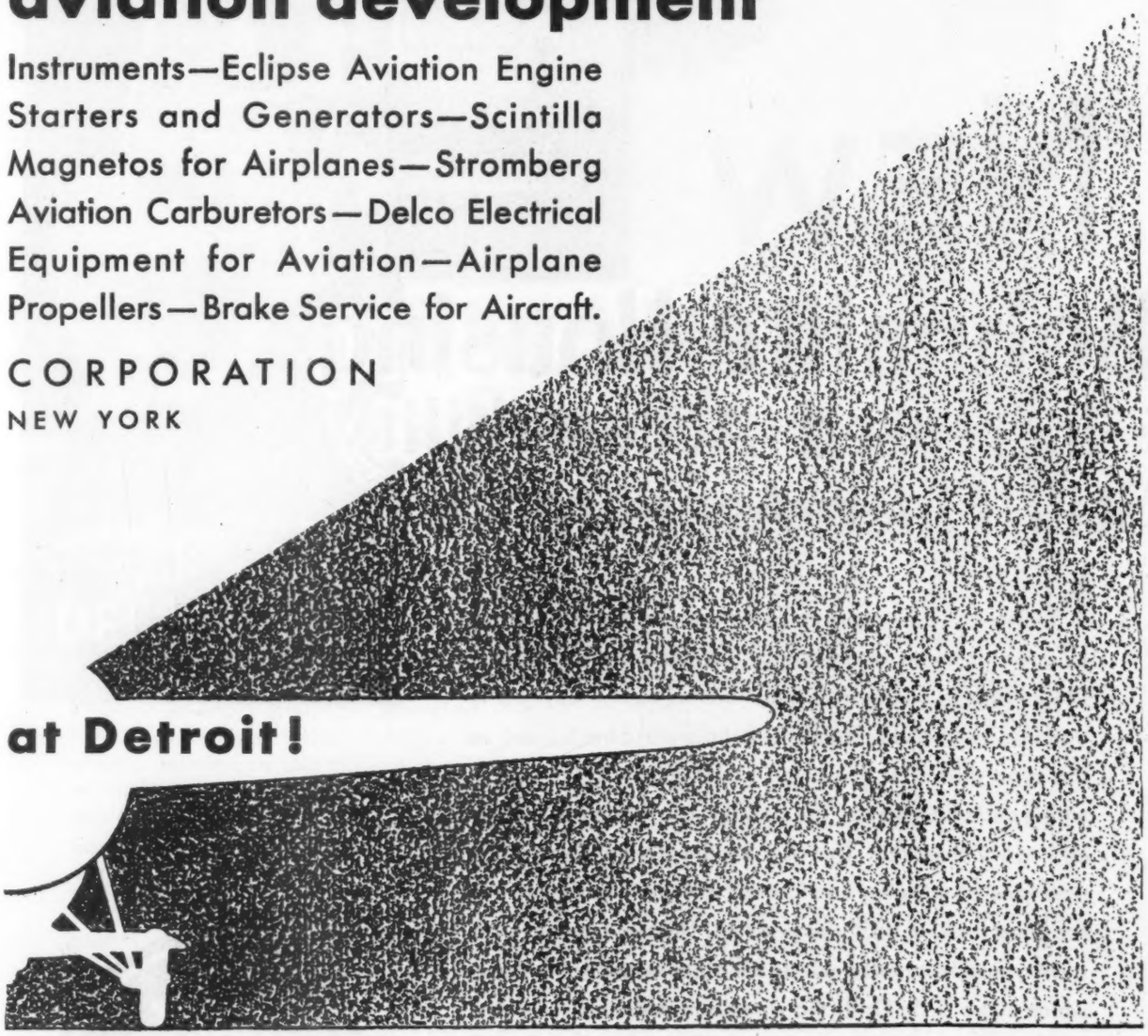
ECLIPSE MACHINE COMPANY, LTD., WALKERVILLE, CANADA

PRODUCTS

aviation development

Instruments—Eclipse Aviation Engine Starters and Generators—Scintilla Magnetos for Airplanes—Stromberg Aviation Carburetors—Delco Electrical Equipment for Aviation—Airplane Propellers—Brake Service for Aircraft.

CORPORATION
NEW YORK



at Detroit!

SUBSIDIARIES

AUTOMOTIVE

BENDIX BRAKE COMPANY, SOUTH BEND, IND.
Brakes for Motor Vehicles

BENDIX-COWDREY BRAKE TESTER, INC., SOUTH BEND, IND.
Automotive Brake Service Equipment

BENDIX SERVICE CORPORATION, CHICAGO, ILL.
National Service for Bendix Products

BRAGG-KLIESRATH CORPORATION, LONG ISLAND CITY, N. Y.
Vacuum Booster Brakes

ECLIPSE MACHINE COMPANY, ELMIRA, N. Y.
Bendix Starter Drive

INTERNATIONAL GERNANDT MOTORS, LTD., SOUTH BEND, IND.
Automotive Diesel Engines

STROMBERG MOTOR SERVICE CO., CHICAGO, ILL.
Automotive Carburetors

STROMBERG RESEARCH CORPORATION, CHICAGO, ILL.
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BENDIX-PERROT BRAKES, LTD., BIRMINGHAM, ENGLAND
STROMBERG MOTOR DEVICES, LTD., LONDON, ENGLAND

THE GOOD MECHANIC'S CHOICE

NEW
Bohnalite Housing
--Increased Accessibility
Still Finer Appearance

NOW you can get even better and longer service from U. S. Drills under hardest usage. The new die cast Bohnalite housing is far stronger than aluminum. See how easily you can remove the side of the handle and housing end on this type drill. This gives you easier access to the switch, wiring and commutator. The brushes, too, are more quickly and easily removed. The new handle design gives you a new idea of gripping comfort and balance, and gives you the finest looking drill you ever had. The same famous U. S. quality and features remain in all other respects—the ones which make U. S. Drills the winners in tests and in service. Yet the prices are no higher—in fact, lower in several cases! Get the new U. S. Drills when you buy.

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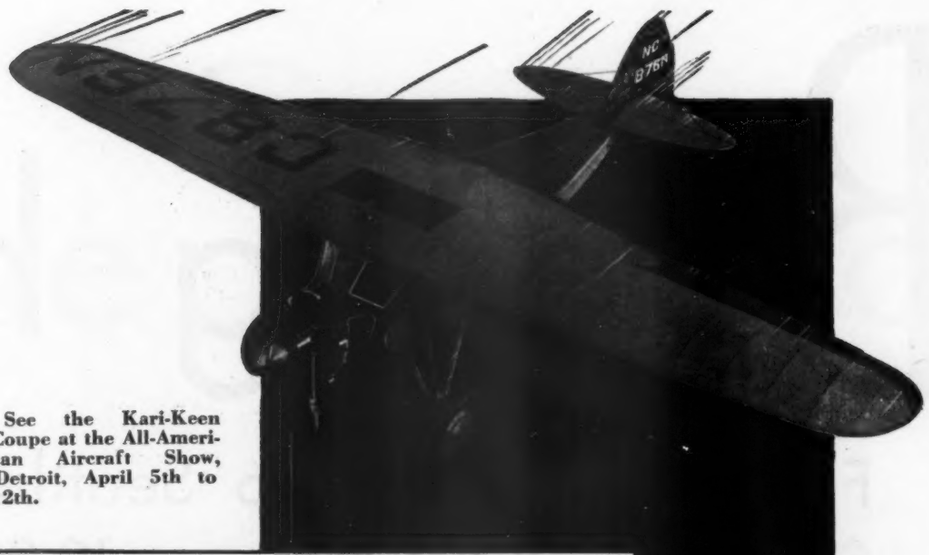
2466 West Sixth Street, Cincinnati, Ohio, U.S.A.

Export Sales Representatives—WESTINGHOUSE ELECTRIC INTERNATIONAL CO.—150 Broadway, New York City

Canadian Division—MAPLE LEAF ELECTRIC TOOLS, Ltd.—Toronto



See the Kari-Keen Coupe at the All-American Aircraft Show, Detroit, April 5th to 12th.

PERFORMANCE
That Means Something

Kari-Keen AIRCRAFT, INC.
Coupe
"The Baby Grand of the Air"

To Kari-Keen engineers, performance means more than merely speed, load capacity, gasoline consumption and other details. It means service in the fullest sense of the word—service that can only be expected of a plane that has been built to the highest standards from a perfectly synchronized design based on sound engineering principles.

The Kari-Keen Coupe has been received enthusiastically by pilots, students, commercial operators and schools as the ship which best meets the particular requirements of the work this class plane is expected to do. Distributors and dealers, likewise, have been more than pleased with the reception given it by their customers.

The reasons the Kari-Keen Coupe has met with such favor are that it is properly designed and built right. A flight in the comfortable, roomy, side-by-side two-seat cabin will confirm in your mind the opinions of others. Write for details and date when a Kari-Keen Coupe will be at your airport.

The Kari-Keen franchise is attractive to distributors and dealers. Wire or write for details.

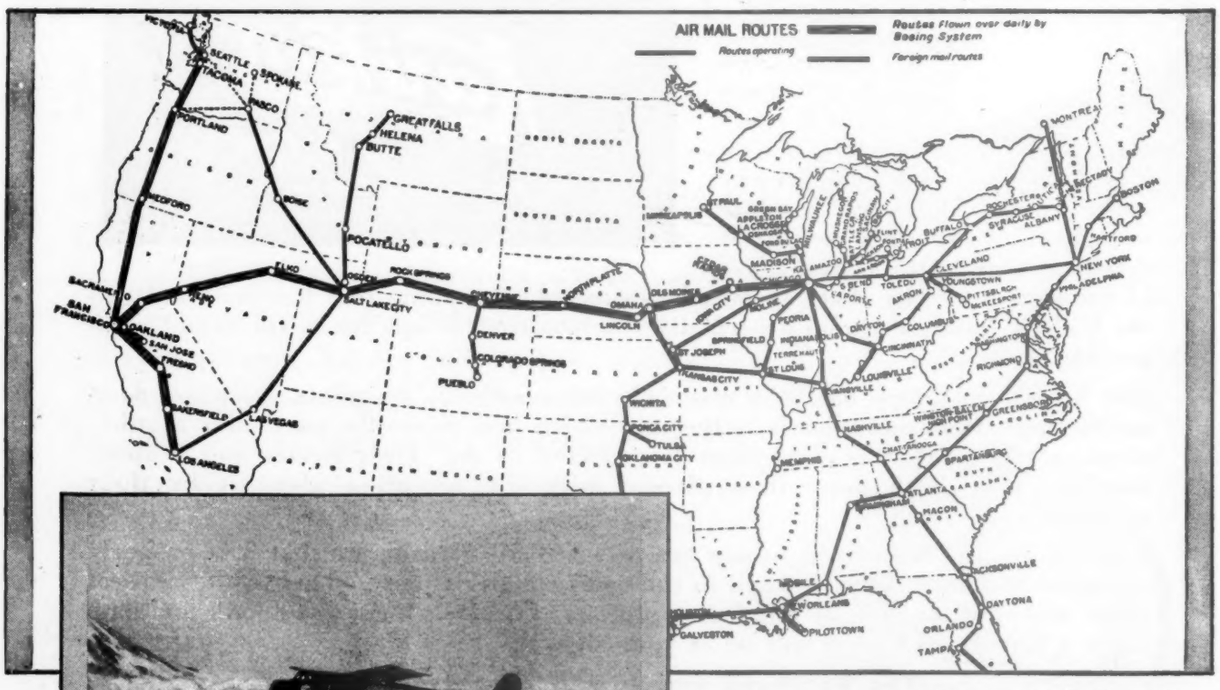
KARI-KEEN AIRCRAFT, INC.

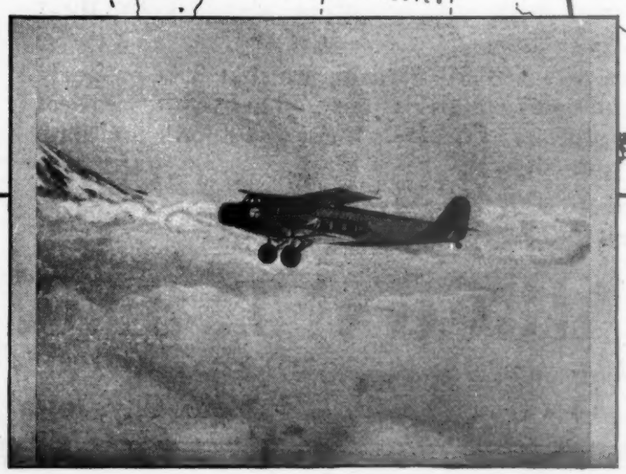
Manufacturers of Cabin Monoplanes

513 Plymouth Street — Sioux City, Iowa

Boeing has

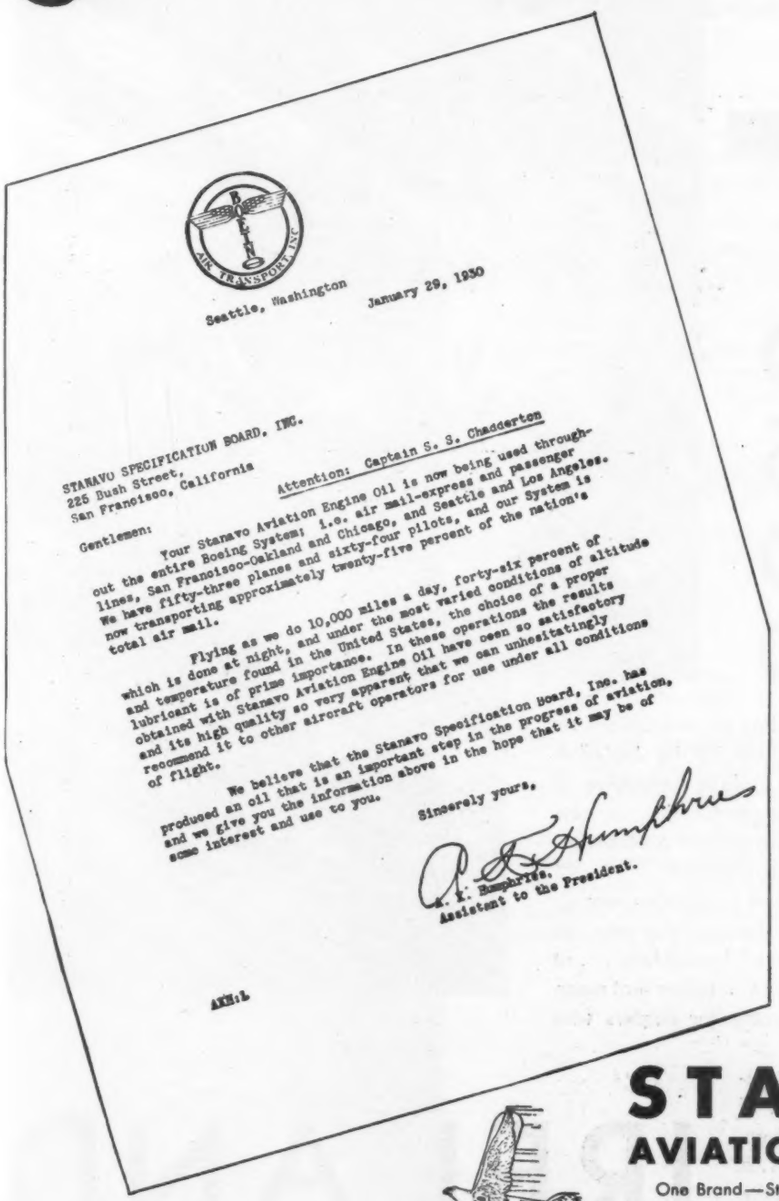
From Los Angeles to Seattle—from San Francisco to Chicago—10,000 miles a day. Boeing System's 53 planes use Stanavo Aviation Engine Oil





10,000 miles daily, 4,600 of which are by night; from summer sunshine to sub-zero weather; over treacherous mountain peaks at dizzying heights—the flying hazards met by the 64 pilots of The Boeing System are extreme daily tests of man and machine. Yet Boeing's record of safe transportation is unsurpassed. An outstanding tribute to system, inspection, and the careful selection of men, equipment and supplies.

gone Stanavo



BOEING AIR TRANSPORT INC.

Seattle, Washington January 29, 1930

STANAVO SPECIFICATION BOARD, INC.
225 Bush Street,
San Francisco, California

Attention: Captain S. S. Chadderton

Gentlemen:

Your Stanavo Aviation Engine Oil is now being used throughout the entire Boeing System; i.e. air mail-express and passenger lines, San Francisco-Oakland and Chicago, and Seattle and Los Angeles. We have fifty-three planes and sixty-four pilots, and our System is now transporting approximately twenty-five percent of the nation's total air mail.

Flying as we do 10,000 miles a day, forty-six percent of which is done at night, and under the most varied conditions of altitude and temperature found in the United States, the choice of a proper lubricant is of prime importance. In these operations the results obtained with Stanavo Aviation Engine Oil have been so satisfactory and its high quality so very apparent that we can unhesitatingly recommend it to other aircraft operators for use under all conditions of flight.

We believe that the Stanavo Specification Board, Inc. has produced an oil that is an important step in the progress of aviation, and we give you the information above in the hope that it may be of some interest and use to you.

Sincerely yours,

A. R. Humphreys.
Assistant to the President.

AXH:L

Stanavo Aviation Engine Oil can be obtained from any of the oil companies listed below:

Standard Oil Company of California
Standard Oil Company (Indiana)
Standard Oil Company of New Jersey
Standard Oil Company (Kentucky)
Standard Oil Company of Louisiana
Standard Oil Company (Nebraska)
Standard Oil Company (Ohio)
Standard Oil Company of Pennsylvania
Beacon Oil Company, Inc.
Humble Oil and Refining Company
Midwest Refining Company
Pasotex Petroleum Company
The Refiners Oil Company
Imperial Oil, Ltd.
Standard Oil Company of Brazil
California Standard Oil Co. de Mexico
Standard Oil Company of Cuba
West India Oil Company

•

STANAVO
AVIATION ENGINE OIL

One Brand—Stanavo · One Quality—the Highest Throughout the World

STANAVO SPECIFICATION BOARD, INC.

Organized and Maintained by

Standard Oil Company (Indiana)
910 S. Michigan Ave., Chicago

Standard Oil Company of California
225 Bush St., San Francisco

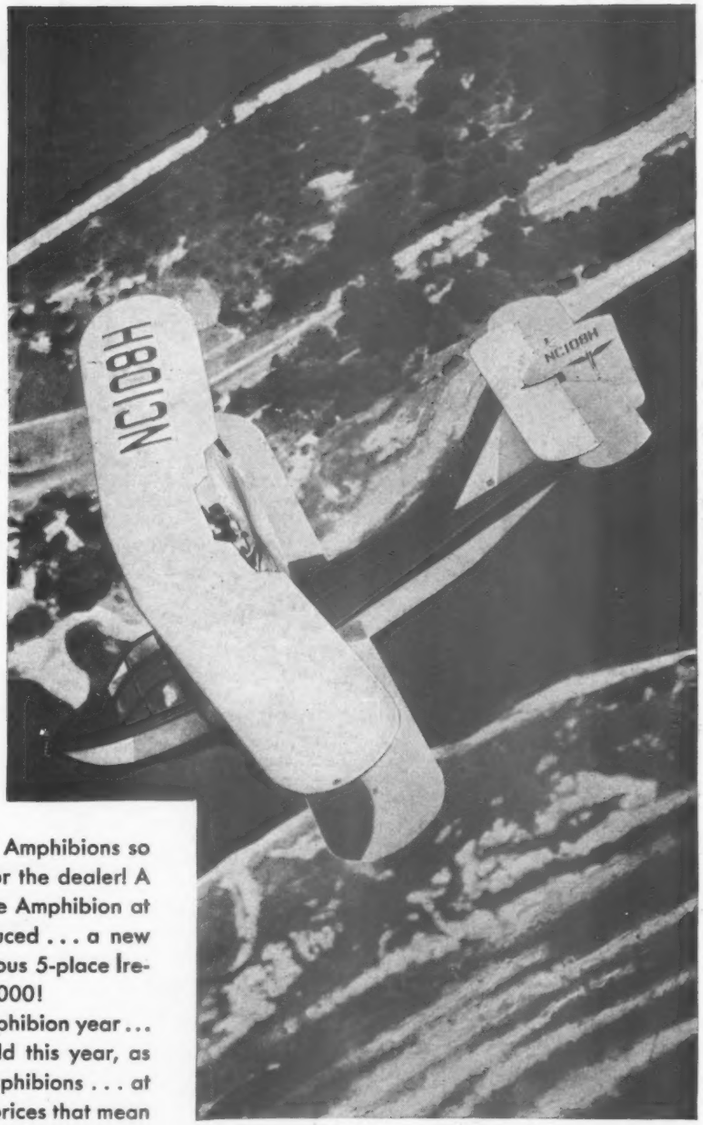
Standard Oil Company of New Jersey
26 Broadway, New York City

THIS IS AN AMPHIBION YEAR!

4

IRELAND MODELS

. . . $4,890 to $23,000



Never has any manufacturer provided a line of Amphibions so salable, with such tremendous potential profit for the dealer! A 2-place Flying Boat at only $4,890 . . . a 2-place Amphibion at $5,550, the lowest-priced amphibion ever produced . . . a new 4-place Amphibion at $18,000 . . . and the famous 5-place Ireland Amphibion at the new reduced price, $23,000!

Leading authorities agree that 1930 is an amphibion year . . . that three times as many amphibions will be sold this year, as last. And here, at last, is a *complete* line of Amphibions . . . at prices to suit almost every air-minded purse . . . prices that mean solid, substantial business and liberal profits for dealers who qualify for the Ireland Franchise.

Every cooperation is being given . . .cultivation of present markets and development of new ones . . . consistent, sales-inducing advertising, in magazines and direct by mail . . . a dealer policy, based on fair dealing and the highest standards of service, which assures mutual satisfaction and profit.

Established aircraft dealers of substantial financial standing are invited to communicate at once with Ireland Aircraft, Inc., Garden City, Long Island, New York.

IRELAND AMPHIBIONS

ANOTHER CONTRIBUTION TO SAFE AVIATION....

LIQUIDOMETER

"Gauges for measuring liquids"

A great many attempts have been made to produce an accurate and dependable tank gauge. Performance has never been able to substantiate the extravagant claims made.

The Liquidometer is not just another tank gauge—it has been proven through many years of actual use. Not a few test units but thousands are in use by over a hundred different industries and the United States Army and Navy. All aircraft type Liquidometers are identical in their operation to the time proven product—the difference is in the size and weight. They have proven their worth on Mail planes, training ships, two, three and four motored planes, amphibians and blimps.

There are three types of Aircraft Liquidometers: Remote Indicating—Direct Reading Flush mount and Direct Reading Protruding (illustrated in order mentioned above).

The *Remote Indicating* type, for use on instrument panel, operates on a patented balanced non-pressure hydraulic system and provides a continuous pointer indication. There are no pumps or electrical connections—a positive automatic temperature and barometer correction is part of the instrument.

The *Direct Reading Flush Mount* can be used on tanks where the end, top or bottom of the tank is exposed to view.

The *Direct Reading Protruding* type can be used on cowl or wing tanks. Both the Direct Reading models are also free from affect of changes in temperature or altitude.

The Engineering Department of the Aircraft Division is in the hands of men who know Aviation. Send us your tank blueprints and we shall return them with Liquidometer drawn in, together with prices. Also specify the type of instrument desired.

Clarence A. deSiers

First Vice-President & Chief Engineer

The LIQUIDOMETER CORP.

36-16 SKILLMAN AVE.

LONG ISLAND CITY, N. Y.

CABLE ADDRESS: LIQUIDGAGE, ALL CODES

Aviation's *One* Spark Plug that *Insures* Better Performance

Elinor Smith (left) broke the world's altitude record for women over Roosevelt Field, New York, March 10. She used Champion Aero A Spark Plugs, of course.

Barney Zimmerley (right), using Champion Spark Plugs, set the new world altitude record for light planes at 27,350 feet, over St. Louis, February 16.

LIKE the Champion Spark Plugs for motor cars, motor boats, outboards and racing engines, Champion's new Aero A does give *better performance* to every type of airplane engine.

Developed after three years of most exhaustive tests and experiments, the Aero A incorporates principles which also bring to all aviation engines a new and greater factor of safety and dependability.

These features have won for the Aero A instant recognition and a rapidly growing demand from transport lines, mail lines, racing flyers and private owners, alike.

The Aero A is the first great basic advance in spark plug design to meet the specific needs of aircraft engines.

The Aero A *cannot be broken in such a way as to interfere with engine operation.* Its carefully proportioned restricted bore permits the use of this spark plug in practically every type of modern radial air-cooled, and high compression water-cooled engine.

Its exclusive dual sillimanite insulators withstand a maximum of oil without fouling, and are so designed that the primary is completely protected by the secondary dome insulator. Its heat range is so great that pre-ignition is unknown. Special analysis electrodes resist all the regular ills of pitting and burning. Its specially molded copper gasket seals are permanently gas tight.

Champion's better performance in every engine is known and recognized the world over—on land, water and in the air.

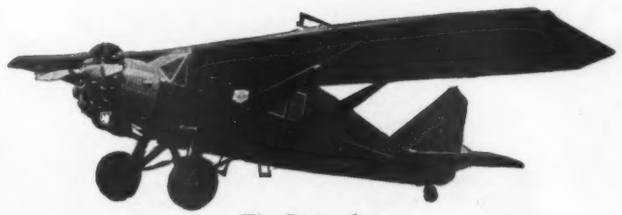
Champion *Spark Plugs* for Aviation

TOLEDO, OHIO **WINDSOR, ONT.**

THREE GOOD REASONS WHY....BELLANCA AIRCRAFT will dominate this year....

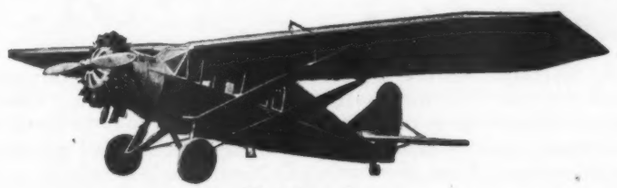
—a statement from G. M. BELLANCA

1.. THE BELLANCA PACEMAKER is the first reason why we are confident that our line of airplanes *will persist in their position of first place for efficiency.* The *Pacemaker* has proved its superiority in quality, speed, safety and immense carrying capacity. It is now powered with either the Wright Whirlwind J-6 or the Pratt & Whitney Wasp Junior. Increasing sales of this fast six-place monoplane, my original enclosed cabin type, show that with the *Pacemaker* we are supplying a definite demand for a quality plane equally successful for operation on wheel gear, floats or skiis.



The Pacemaker

2.. THE BELLANCA SKYROCKET is our second reason for predicting dominance in 1930. Equipped with the efficient 420 hp. Pratt & Whitney Wasp engine, a plane of increased power and dimensions, the *Skyrocket* retains all of the well-known characteristics of the *Pacemaker*, providing an unrivalled combination of quick take-off, steep climb, high speed, ruggedness and stability. Its full speed is 150 m.p.h., its climb 1,450 ft. per minute, and its useful load 2,050 lbs. The *Skyrocket* is in every sense a luxury plane.



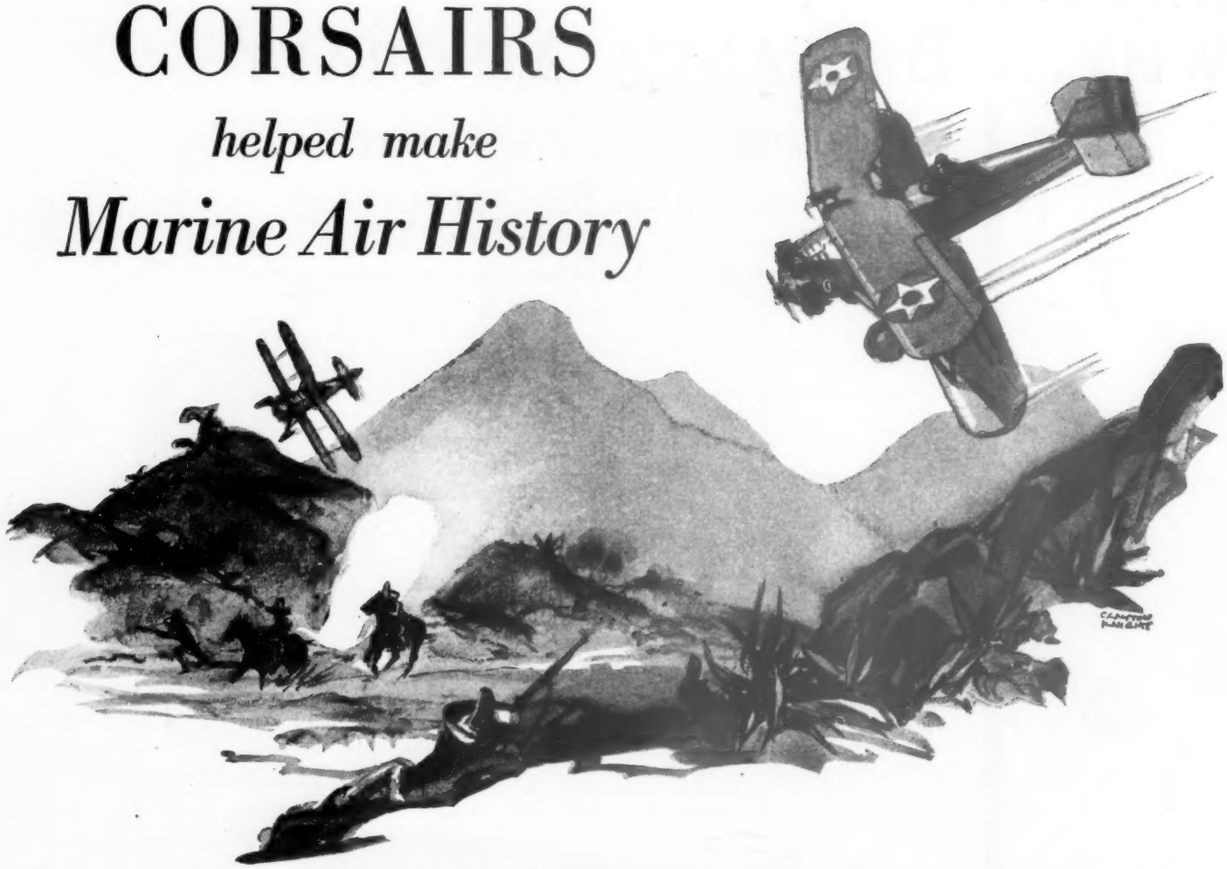
The Skyrocket

3.. THE BELLANCA AIRBUS is a 12 to 14 place plane with large, comfortable cabin, designed for airline operation. It carries 12 passengers and one pilot, or 11 passengers and two pilots, with ample baggage space. We have convinced ourselves through extensive experimental work and flight testing that this plane is ready to serve *with complete satisfaction.* We have given it a wing area of 646 sq. ft., and the interchangeable engine mounting will accommodate the Pratt & Whitney Hornet, the Wright Cyclone, or the Curtiss Conqueror, all geared down. Because of its unusual reserve performance, the new AIRBUS will carry a useful load of 4,100 lbs. with utmost ease, on either wheel gear or floats, making 145 m.p.h. as a landplane or 135 m.p.h. as a seaplane. For economy, we expect the AIRBUS to save nearly 40% of the current operating costs per passenger mile as compared with trimotored craft of similar capacity. Here is our third good reason for counting this another big year! And behind these are many other reasons and facts which our sales department will be glad to send to you on request.—G. M. BELLANCA, *Pres.*

BELLANCA AIRCRAFT CORPORATION
NEW CASTLE, DELAWARE

BELLANCA

In Nicaragua CORSAIRS *helped make Marine Air History*



THE situation the U. S. Marines met in Nicaragua was not just one of revolutionists, bandits, outlaws. It was complicated by the character of the country itself—mountainous, jungle-covered, inaccessible.

Ideal for revolutionists—difficult for the Marines.

But the revolutionists had reckoned without *Corsairs*. The Marines had brought with them a squadron of *Corsairs*, of which *Corsair A-7532* was one. And it was not long before Marine officers learned that their *Corsairs* were the direct solution of most of their problems.

Corsair A-7532 was shipped directly from the factory to Nicaragua where is was assigned for duty with the VO-7M squadron. In Nicaragua the A-7532 and its sister *Corsairs* performed a multiplicity of duties—observations; light bombing; clearing out revolutionist ambush nests; even evacuation of wounded. All this keen performance under tropical, mountainous, difficult war-time conditions.

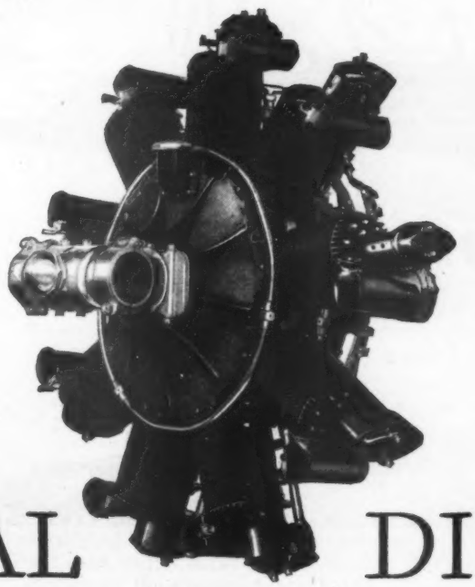
Only ships of climb—of manoeuverability—of speed—of rugged dependability could perform day in and day out under such conditions. How Marine *Corsairs* performed in Nicaragua is a matter of record.

The *Corsair* is carving out a niche for itself in the history of Marine aviation.

CHANCE VOUGHT CORPORATION, Long Island City, New York. Division of United Aircraft & Transport Corporation.

CHANCE VOUGHT CORPORATION

PACKARD



RADIAL DIESEL AIRCRAFT ENGINE

PACKARD—the "Master Motor Builders"—announces the first public showing of the Packard-Diesel Aircraft Engine at the All-American Aircraft Show, Detroit, April 5–13.

This revolutionary new engine will be exhibited by Packard in spaces 13–15, Hoover Airway. Several leading aircraft manufacturers will also exhibit planes on which the Packard-Diesel is standard equipment.

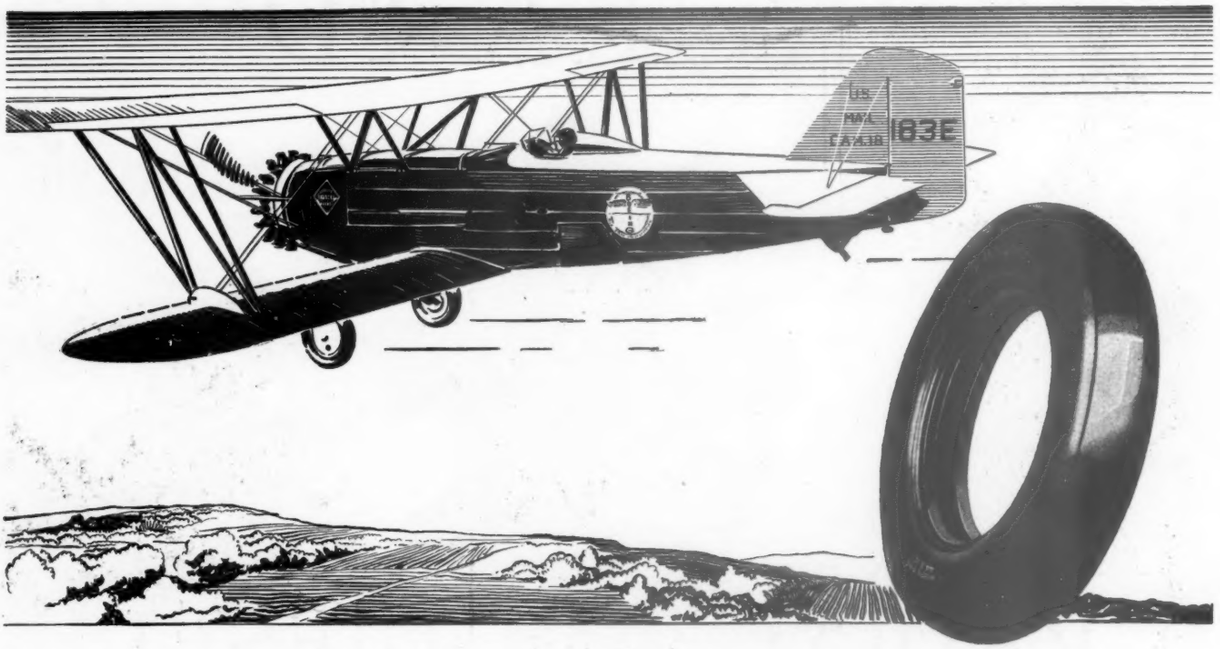
The Packard-Diesel Aircraft Engine has successfully met the Department of Commerce requirements for an approved type certificate and has been officially rated at 225 H. P. It is now in quantity production and will soon be seen on planes at many flying fields. In view of this, arrangements are rapidly being perfected to provide fuel at all airports.*

You are cordially invited to inspect the Packard-Diesel Aircraft Engine—see how easily it starts, how quickly it warms up, how smoothly it operates at all speeds. Flight demonstrations in Packard-owned planes will be available to interested aircraft manufacturers during the week of the Show at the Detroit City Airport.

PACKARD MOTOR CAR COMPANY
DETROIT, MICHIGAN

**The Texas Company has already arranged fuel supply throughout their international distributing system in the U. S., Canada and Mexico.*

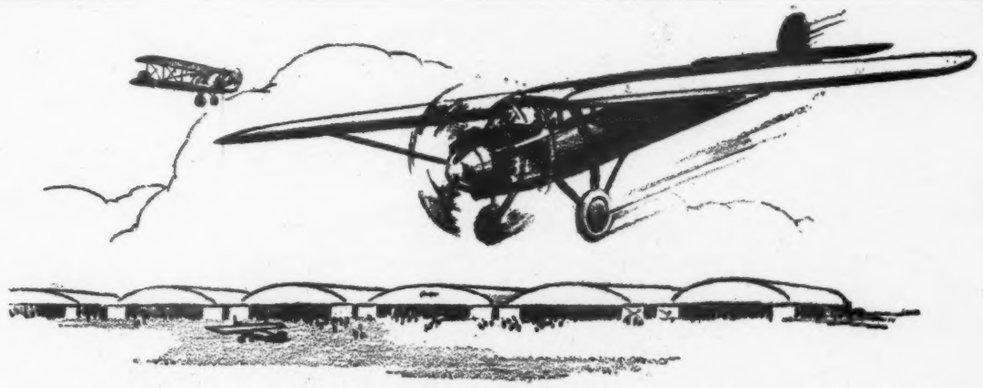
Air-Minded for 22 Years

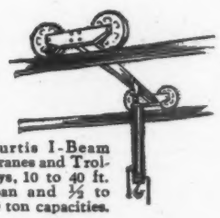


Aviation is no new plaything with the United States Rubber Company. It has been a *business* with U. S. since 1908. The world's *first* airplane tire was the first contribution of U. S. engineers to safer, more economical flying. Since that historic development many U. S. contributions to aviation have followed — larger, tougher tires — then today's Web-Cord tires of still stronger but lighter construction. U. S. offers today's aircraft manufacturers a rubber engineering service that is air-minded by *experience* rather than by fancy. Here you will find competent assistance with any aviation problems in which rubber plays a part.

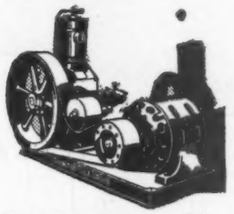
UNITED STATES RUBBER COMPANY — WORLD'S LARGEST PRODUCER OF RUBBER

U. S. ROYAL AIRPLANE TIRES



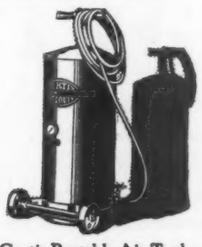


Curtis I-Beam Cranes and Trolleys, 10 to 40 ft. span and ½ to 10 ton capacities.



Curtis Compressors are ¼ to 50 H. P. with capacities up to 250 cu. ft. per minute.

Curtis Air Hoists, capacities from ½ ton to 10 tons.



Curtis Portable Air Tank—For taking air out to a plane away from the usual source of supply.

Write for new Catalog C-76

Speeding up airplane production and servicing

with Curtis compressed air equipment

FULLY as important as the speed of planes is the speeding up of the building maintenance and servicing of planes. Executives throughout the aviation industry are rapidly coming to realize that compressed air is one of the most important factors in putting speed into this work.

Obviously, time, labor and money are saved in very appreciable amounts by compressed air equipment such as—

CURTIS TIMKEN EQUIPPED COMPRESSORS —providing air for spray painting, spraying dope on the wings, tire inflation, charging shock absorbers, spray cleaning engines, spraying of grease solvent or paint removers, air-drying of parts dipped in cleaning solutions, blowing out dust, chips, etc., at work benches and drilling presses; air power for operating air hoists, riveters, pneumatic drills, sand blasts, pneumatic water systems, etc.

CURTIS AIR HOISTS—Power hoists at little more than the cost of chain blocks. Used with a Curtis I-Beam Trolley or Crane, they can serve a wide floor area. Used for lifting engines out of fuselages, mounting engines, and other parts, and many other purposes where a combination of power, speed and accuracy is a factor of economy. Because there are no delicate mechanisms, even unskilled laborers can operate Curtis Hoists without danger of throwing them out of commission.

CURTIS AIR TANKS—Portable tanks for taking air out to a plane away from the usual source of supply. Stationary tanks for use with compressor unit in the shop, also separate tanks for mounting on service trucks.

CURTIS

St. Louis

The Curtis Pneumatic Machinery Co., was founded in 1854 and is, therefore, in its 76th year. Three-quarters of a century successful business existence can be explained only by integrity, sound policy and financial strength to permit the extensive development and research work necessary to keep our products in advance of competition.

1954 Kienlen Ave., St. Louis

5518 AF Hudson Term., N. Y.

Write for Catalogue C-76 and state the product, etc.

A2

Just Read The LETTER

There Must Be a REASON

NEW STANDARD AIRCRAFT CORPORATION
Paterson, New Jersey

OFFICE OF THE CHIEF ENGINEER

February 11th, 1930.

Titanine, Inc.,
Morris & Elmwood Ave.,
Union, N. J.

Gentlemen,

Titanine Navy Nitrate Dope and Pigmented Dope have been used exclusively on all New Standards, including both trainers and five-place planes, and we take pleasure in advising you of the complete satisfaction your products have given.

Many of our planes, used for short-ride passenger carrying and training, have had continuous exposure to all conditions of weather for many months and the covering has shown remarkable resistance to deterioration.

We wish to take this opportunity to recommend Titanine Products to all manufacturers and users and to express our appreciation for the cooperation which your company has always extended to us.

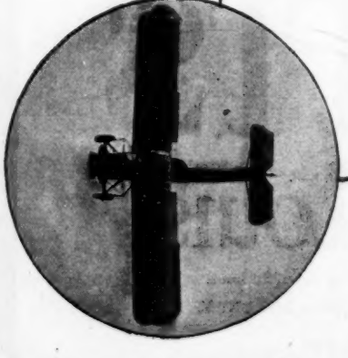
Very truly yours,

NEW STANDARD AIRCRAFT CORPORATION,

Chas. H. Day

Charles H. Day,
Chief Engineer.

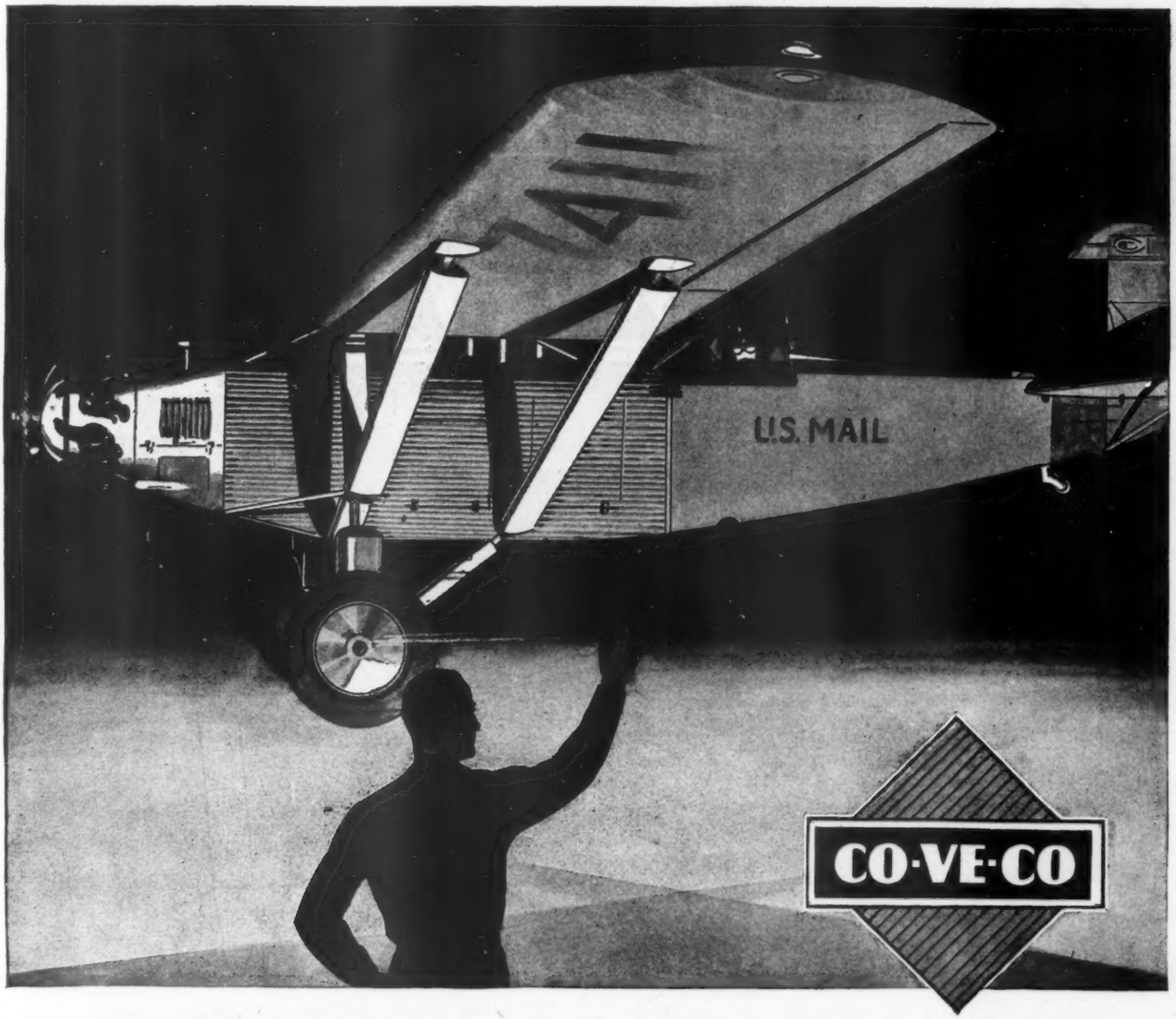
chd:cm



STANDARD AIRPLANE FINISHES SINCE 1923
TITANINE

No. 4 of the Titanine series of Planes finished in Titanine schemes.

TITANINE
REGISTERED TRADE MARK



Speeding Your Letters on . . .

WINGS OF CO-VE-CO!

HERE is a plane built exclusively for the transportation of mail and express, fuselage of metal with wings of Co-Ve-Co. Breese Aircraft of Portland, Oregon, selected Co-Ve-Co because it was the best. Co-Ve-Co plywood is manufactured without steaming or treating in any way. Logs cut cold retain all the strength endowed by nature through centuries of growth, this is the secret of Co-Ve-Co durability, here is the reason for Co-Ve-Co's strength and stubborn resistance to moisture absorption. . . . Aircraft engineers have found that Co-Ve-Co Port Orford Cedar and Co-Ve-Co Sitka Spruce combine an exceptional lightness with a strength factor found in no other woods, that is why an ever increasing number of new planes u'ilize Co-Ve-Co. . . . You too should investigate Co-Ve-Co plywood. Standard sizes stocked for immediate shipment or, if you prefer, Co-Ve-Co can be manufactured to your own specifications and requirements.

PORT ORFORD CEDAR PRODUCTS COMPANY
Marshfield, Oregon

Southern California
CALIF. PANEL & VENEER CO.
955 S. Alameda Street
Los Angeles

Exclusive Sales Representatives
DANT & RUSSELL, INC
Portland, Oregon

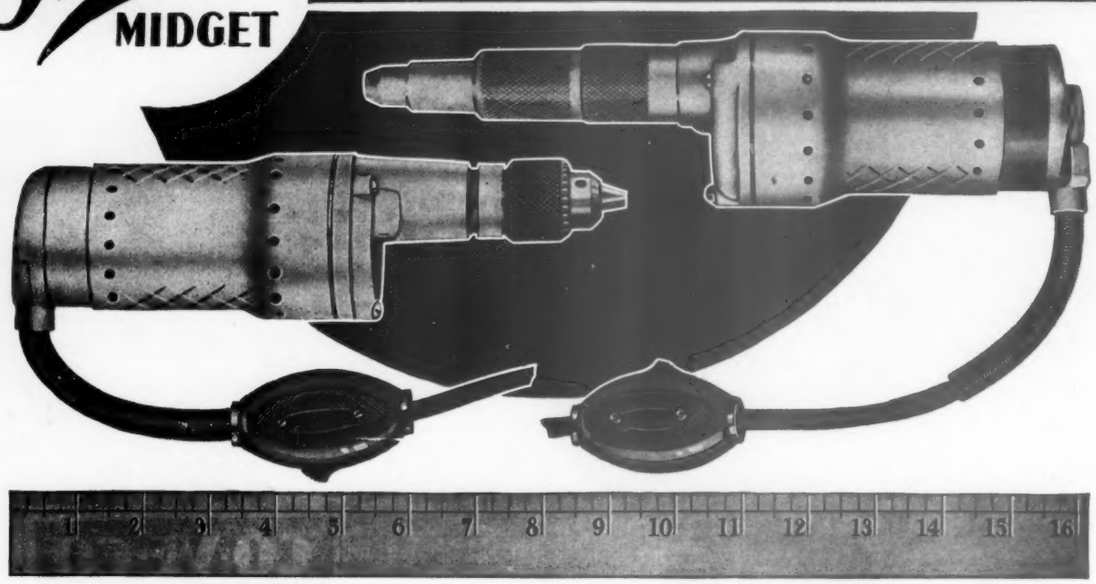
Northern California
H. B. MARIS PANEL CO.
735 Third Street
San Francisco

TRAVEL BY AIR . . . FLY YOUR MAIL AND EXPRESS

the Smallest Electric Tools Made

Thor MIDGET

ELECTRIC DRILLS and SCREW DRIVERS



Exceptionally Light In Weight and Speedy

These small electric drills and screw drivers were especially designed for fast, delicate work. Since their introduction, they have rapidly taken the place of small hand operated tools because of their practicability and the many different kinds of work they can be used on.

They fit into the palm of the hand, and being light, are very easily handled. Ideal for Aeroplane, Automobile, Radio, Furniture, Machinery and Electric Appliance manufacturers.

The drills are made in two sizes—$\frac{3}{16}$ and $\frac{1}{4}$ in. capacity. Weight is $2\frac{3}{4}$ lbs. Length overall is $9\frac{1}{4}$ in.

The screw drivers are made in three types: one at 1250 R.P.M. for No. 8-32 metal screws; one at 950 R.P.M. for No. 10-24 metal screws; and one at 485 R.P.M. for No. 8 Wood Screws. Weight is 3 lbs. Length overall is $11\frac{1}{4}$ in.

You can try one of these small tools in your own shop for ten days free of charge. Put it to the test. If its performance doesn't satisfy, return it at our expense. No red tape.

INDEPENDENT PNEUMATIC TOOL CO.

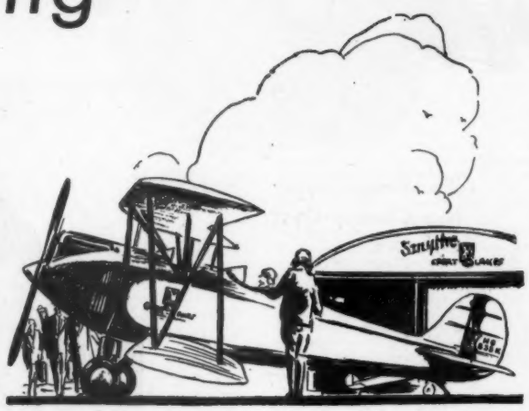
New York ····· TOOLMAKERS SINCE 1893 ····· *London*

PNEUMATIC TOOLS ··· ELECTRIC Thor TOOLS ··· AIR COMPRESSORS

232 So. Jefferson St. Chicago, Illinois

We're putting Aviation on a *money making basis!* . . .

With new low prices and a Profit-producing Operating-Dealer plan



GREAT LAKES pioneered the movement to put flying within reach of every-one by lowering the price of its improved 1930 model Sport-Trainer from $4990.00 to $3150.00. Now Great Lakes goes even further with a new Operating-Dealer plan that puts Commercial Flying on the same established, profitable basis as any other business.

Great Lakes Operating-Dealers are leaders in Commercial Aviation in their localities. They are keen business men as well as experienced fliers. They operate the leading flying schools; their repair hangars are headquarters to all visiting pilots for maintenance; their other flying activities are varied and profitable. And they lead in ship sales, too . . for Great Lakes' outstanding performance, smart appearance and amazing low price . . $3150 . . makes it the unquestioned favorite of the air-minded public everywhere!

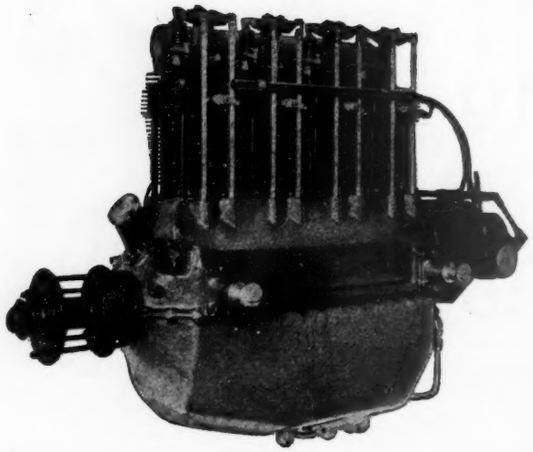
We'll show you how to get into the *money* end of flying. We'll show you how we have helped others to organize, to finance, to service, to operate on a profit-making plan that is workable all year round. A great national advertising campaign helps you build your business.

If you would like to establish yourself permanently and profitably in your community with a Great Lakes franchise, write us details of your present operations and a resumè of flying activities in your city. . . . Great Lakes Aircraft Corporation, 16950 St. Clair Avenue, Cleveland, Ohio.

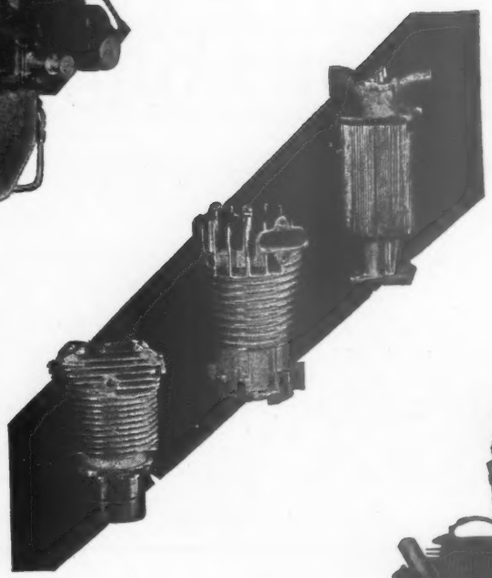
Manufactured under U. S. Department of Commerce Approved Type Certificate Number 228

GREAT LAKES AIRCRAFT
CORPORATION — CLEVELAND
Contractors to the United States Army and Navy

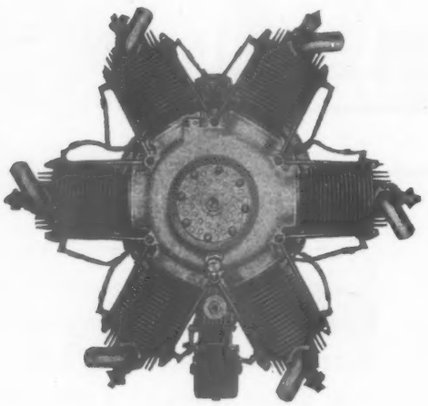
The Cylinder for the Motor!



The Wright Gypsy has Cheney-Cast Cylinders



The Brownback C-400 has Cheney-Cast Cylinders



Any unusual and intricate cylinder design requires skill and sound casting experience.

Our past record in the casting of cylinders for motorcycle and automobile engines, stationary engines, and air-cooled motors for aviation allows us, to-day, to claim greater experience in casting methods and metallurgic research.

We can furnish castings in the rough, or machined cylinders ready for assembly, direct from your blue prints.

Our twenty-five years' experience in casting air-cooled cylinders is available to any responsible motor manufacturer.

S. CHENEY & SON

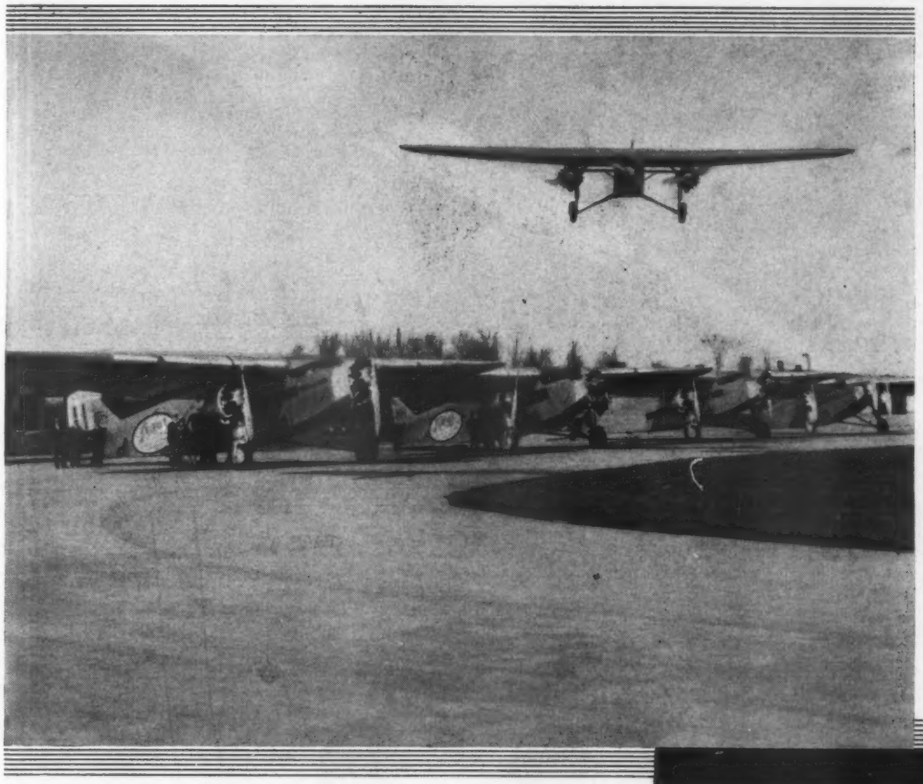
Manlius, N. Y.

CHENEY ~ CAST ~ CYLINDERS

High Strength ~ Low Cost

201

1,000,000 MILES . . . STOUT AIR LINES!



The Ford Plane

The Ford plane is planned, constructed and operated as a commercial plane. Built of corrugated aluminum alloys, it has great structural strength, unequaled durability, and is most economical to maintain in operation. The uniformity of its material is determined by scientific test. All planes have three motors in order to insure reserve power to meet and overcome all emergencies. The engines may be Wright or Pratt & Whitney, air-cooled, totaling from 900 to 1275 horse-power. Ford planes have a cruising range of from 580 to 650 miles and a speed range of from 55 to 135 miles per hour. Loads may be carried weighing from 3670 to 6000 pounds.

The capacity of these planes is 13 to 15 passengers and a crew of two (pilot and assistant). Planes can be equipped with a buffet, toilet, running water, electric lights, adjustable chairs.

The price of the Ford tri-motored, all-metal plane is exceptionally low because of its highly scientific methods of commercial production. Price is $42,000 to $55,000 at Dearborn.

Ford branches will be glad to give you information on the Ford tri-motored, all-metal plane in all models.

●

On schedule service Ford planes frequently fly in two or more sections to meet the demand for swift, comfortable transportation.

ALMOST incredible is the achievement of Stout Air Lines, operating the Detroit-Chicago-Cleveland routes. Up to the end of 1929, well over a hundred thousand passengers had been carried eight hundred and forty thousand miles without the slightest injury to a passenger, and with an extraordinary record both for reliability and the percentage of scheduled trips completed! *Ford all-metal, tri-motored transports only are used on these lines.*

The first operating route of Stout Air Lines was between Detroit and Grand Rapids, beginning in August, 1926. Since then new lines have been opened . . . schedules extended . . . rates cut almost in half!

Four round trips a day are flown between Detroit, Toledo and Cleveland. One way fare is $10. Two round trips daily are flown between Chicago and Detroit, one way fare being $18. On this route stops are made at Battle Creek, Kalamazoo and South Bend. The demand for passage on these lines is so great that on one occasion, at least, it was necessary to run eleven sections.

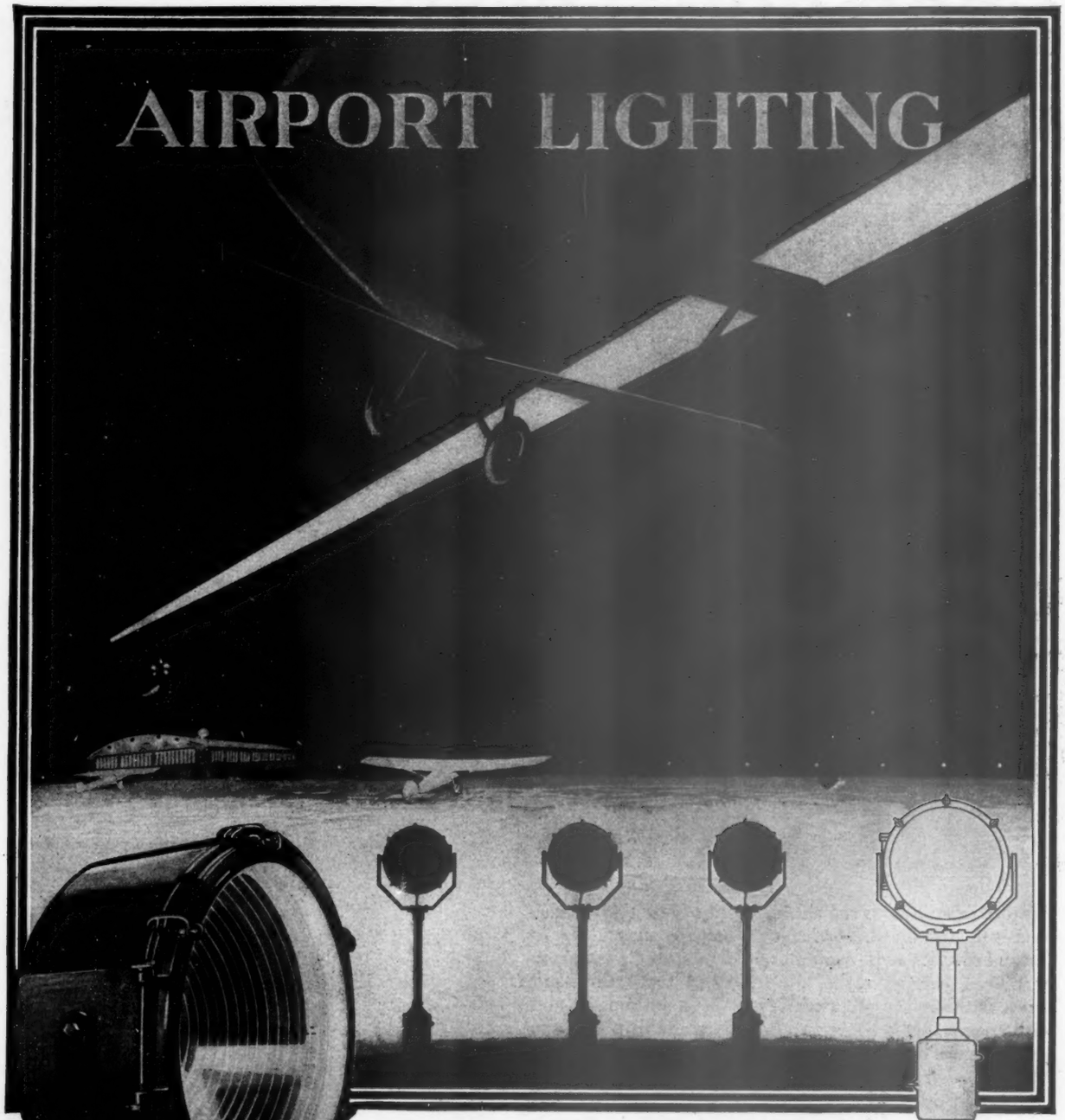
Ford planes are used on these lines with the steady dependability of trains and busses. They are recognized by every one as a permanent form of swift transportation.

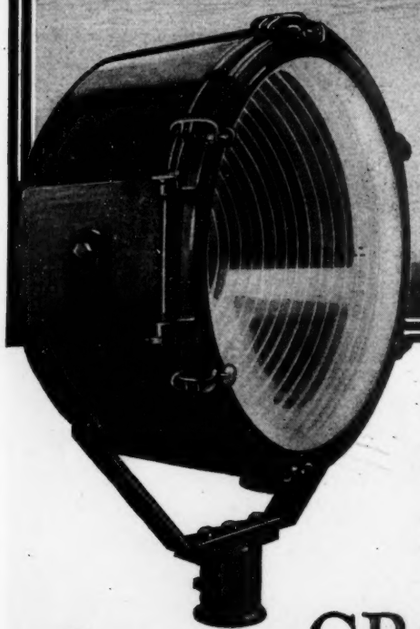
All classes accept transportation by Ford planes with the same confidence that they accept rail transportation.

FORD MOTOR COMPANY

Visitors are always welcome at the Ford Airport at Detroit

AIRPORT LIGHTING

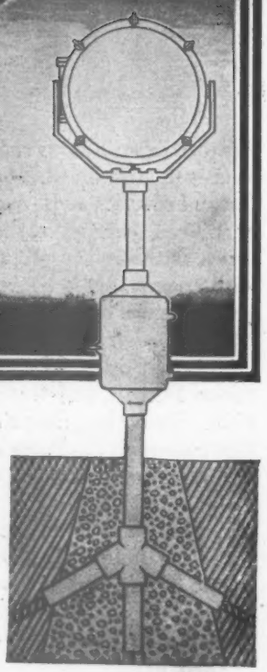




In order to put flying on a 24 hour basis airports must be adequately illuminated to make the night operation of planes as safe as it is in the daytime. For this lighting only the best and most reliable equipment should be used.

Crouse-Hinds Company manufactures a complete line of dependable, and efficient airport lighting equipment.

Airport Catalog No. 311 will be sent upon request.



Type DCE24

CROUSE-HINDS

ESTABLISHED 1897

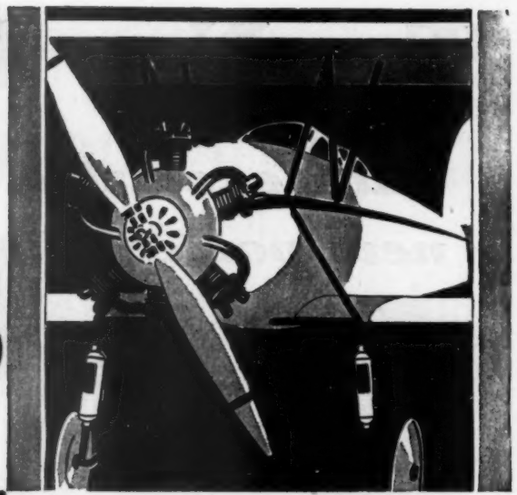
SYRACUSE, N. Y., U. S. A.

SALES OFFICES

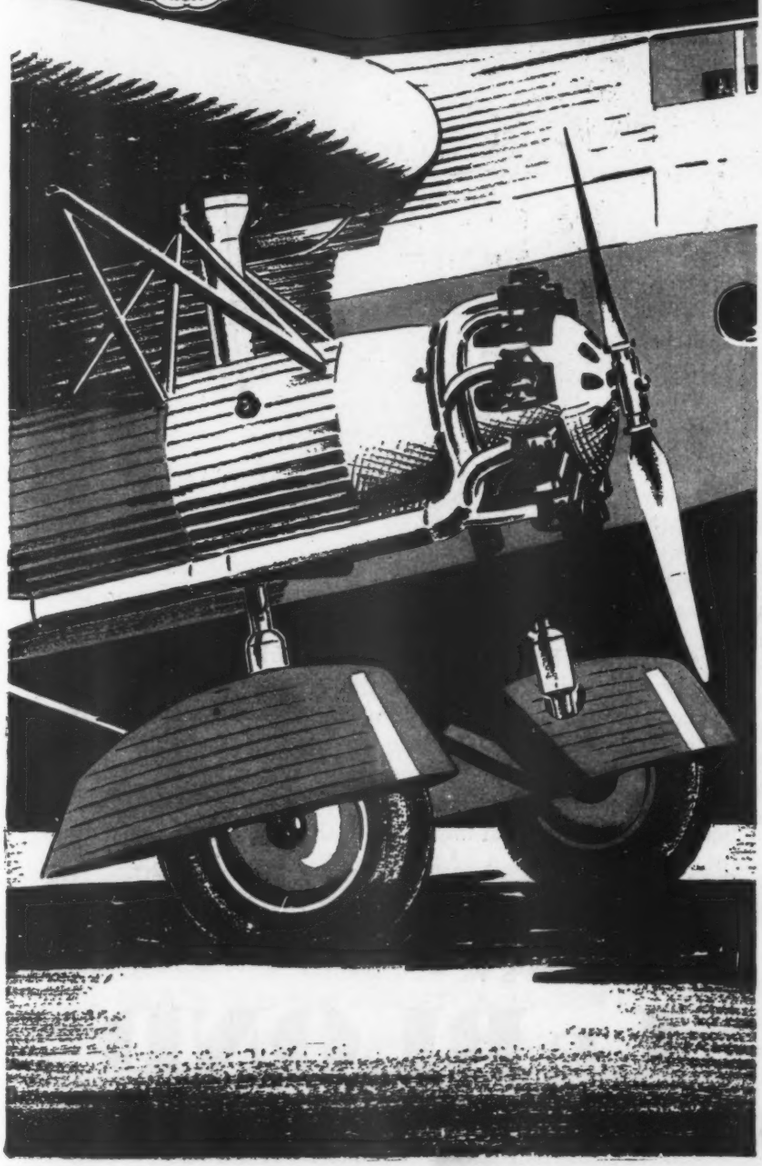
NEW YORK · BOSTON · PHILADELPHIA · DETROIT · ATLANTA · MILWAUKEE · CHICAGO · ST. LOUIS · CLEVELAND · CINCINNATI · MINNEAPOLIS · PITTSBURGH · LOS ANGELES · SAN FRANCISCO · DALLAS · SEATTLE

C-H 508

WITHOUT REBOUND -GRŪSS



GRŪSS
RIDE LAND
ON CUSHIONS OF AIR



WHO CUSHIONS YOUR CUSTOMER?

ON a surprising number of airplanes *not Gruss equipped*, there are two kinds of rebound! The first is a rebounding sway and joggle from uneven ground or ragged landings. The second, a by-product of the first, is the rebound from your customer that will surely follow.

It is only a matter of landings until your customer becomes bump-conscious and Gruss-wise! Gruss struts, streamlined in our factory, are shipped to you complete with fittings ready for instant installation in your plane. Gruss costs no more. Gruss struts are lighter and require less service, and above all else, Gruss insures smooth landings *without rebound.*

Why wait until your customer rebounds, dissatisfied, before you too become Gruss-wise? Now is the time to eliminate plane and customer rebound and lessen sales resistance! *Change to Gruss!*

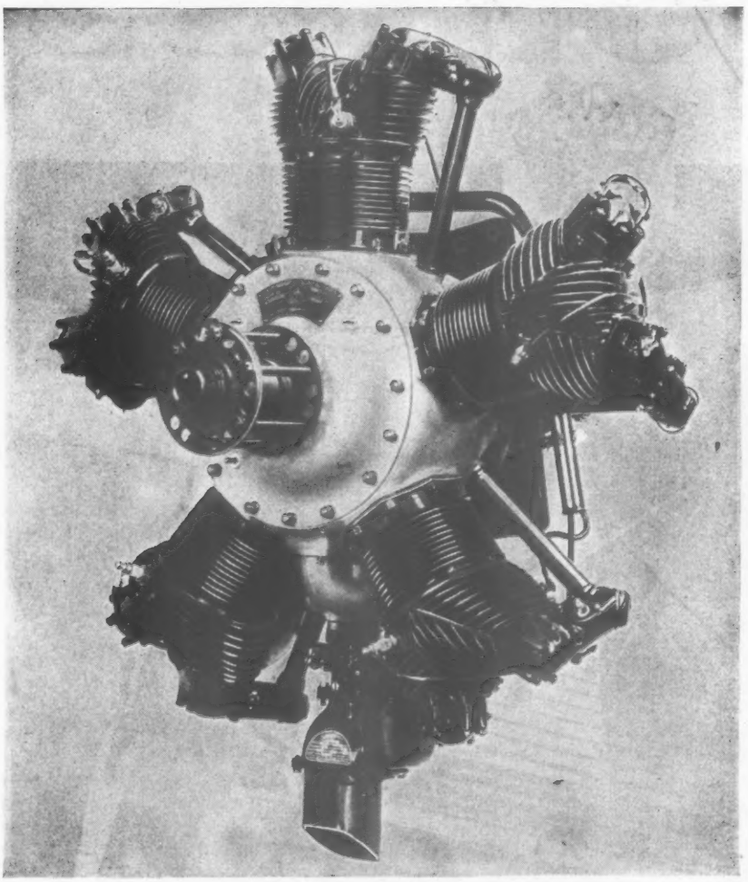
Gruss struts are demanded by the manufacturers of America's largest land planes. Gruss also manufacture a complete line of amphibion shock absorbers which includes a hydraulic retractable gear. *Write for details.*

GRUSS AIR SPRING COMPANY OF AMERICA, Ltd.
4536 District Blvd., Central Mfg. District
Los Angeles, California

THE NEW LEBLOND "66"

with exclusive LeBlond unit assembly

new power..light weight..low upkeep



Approved by the Department of Commerce

The finest thing to be said of the new Le Blond "66" is that it possesses exclusive Le Blond *unit assembly*, first introduced with the Le Blond types "60" and "90" Engines.

Ask any mechanic of Le Blond *unit assembly* - - how easy it is to inspect a certain part, - - or to remove gear case assembly, or crank shaft assembly for inspection, without tearing down the whole engine. He will tell you of these and other vital features of Le Blond *unit assembly* which provide for vital speed, ease, and economy of servicing.

The new Le Blond "66" is especially adapted to high performance, two and three-place ships. Cylinders are of steel and aluminum construction effecting a considerable saving in engine weight. Bore has been increased and the engine speed raised to give a much higher rating than in the "60".

Specifications

Le Blond "66" - - Model 5-DF

Type	*5 cylinder - - Radial - - Air Cooled*
Rating	*85 H. P. at 2125 R. P. M.*
Bore	*4.250 in.*
Stroke	*3.750 in.*
Total Displacement	*266 cu. in.*
Compression Ratio	*5.4 : 1*
Overall Diameter	*33¼ in.*
Overall Length	*22¼ in.*
Weight (less Hub)	*219 lbs.*

An exclusive Le Blond feature is the anti-friction rocker box assembly with shim for positioning fulcrum of rocker arm with respect to valve stem. With shim adjustment whenever valves are ground, there is an absolute minimum of wear in the valve guide bushing. The high-efficiency-cooling "pompadour" cylinder head, originated by Le Blond engineers in the Le Blond "60," is now further refined and improved in the "66".

Sleek, powerful, racy, dependable, - - just demonstrate the Le Blond "66" and know for yourself the exhilaration of high performance at its best. The Le Blond Aircraft Engine Corporation, Cincinnati, U. S. A.

-LE BLOND-

AIRCRAFT ENGINES

These Men are Responsible for your Training

at America's Largest and Finest Air College

Oliver L. Parks, Vice-President and General Manager of Parks Air College. Formerly a member of the U. S. Marine Corps. Member, Board of Directors, St. Louis Aviation Corporation. Mr. Parks has been closely identified with aviation development for the past 7 years. All courses at Parks Air College are personally supervised by Mr. Parks.

Edward S. Evans, President and Director, Detroit Aircraft Corporation. Treasurer and Director, Stout Airlines. Honorary President, National Gliders Association. Vice-President, Aeronautical Chamber of Commerce. President, Evans Auto Loading Company. Director of National Air Transport, Detroit Aviation Society, Detroit Savings Bank, Manufacturers Trust Co. of New York. Mr. Evans is one of the world's leading figures in the aircraft industry.

James Work, General Manager, Detroit Aircraft Corporation (of which Parks Air College is a subsidiary). Formerly Chief Engineer, Naval Aircraft Factory (1920-1926). Member Annapolis football coaching staff for 7 years. Member of the first crew of the dirigible Shenandoah. Mr. Work has long been prominent in aviation circles.

NO institution is greater than the men behind it. When you enroll for training at Parks, you place your future in the hands of men who have attained *undisputed national leadership* in aviation. Men whose names and achievements are known and respected throughout the aviation world.

Parks Air College is a division of the Detroit Aircraft Corporation, a giant industrial organization which includes five of America's finest aircraft factories. The tremendous resources, facilities and prestige of this mammoth concern are behind Parks.

No matter what kind of a training course you are considering, Parks—*above all other schools*—is best able to give you what you want. Do you aspire to a private, limited commercial or transport pilot's license? Come to Parks—here you will find a large staff of the most capable instructors, a great fleet of *over 30 training ships* of many types, and the most *thorough* and *complete* instruction courses imaginable. Come to Parks if you want to become an airplane and engine mechanic—we give you the same *quality of instruction* as our pilot students receive. *All courses are under Mr. Parks' personal supervision.* He tolerates nothing but the best and most modern methods of training for every student.

Wherever you live, it will pay you to come to Parks for your training. Don't gamble with your future. Your best chance of success lies in entrusting your training to this great, time-tried institution. Send coupon for details.

Parks Air College was one of the first to be licensed by the U. S. Department of Commerce as a fully accredited transport school

PARKS AIR COLLEGE

DIVISION OF DETROIT AIRCRAFT CORPORATION

483 Missouri Theatre Building

ST. LOUIS ⌄ MISSOURI

COUPON

PARKS AIR COLLEGE,
483 Missouri Theatre Building, St. Louis, Missouri

Without cost or obligation to me, please mail your illustrated catalog.

Name .....

Street address .....

City ..... State .....

Occupation ..... Age .....

I am interested in
Pilot's Course ☐
Mechanic's Course ☐

Brunner Equipped Machine Shop, Curtiss Flying Service Hangar, Buffalo, N. Y.

BRUNNER EQUIPMENT KEEPS THEM IN CONDITION

Compressed air plays an important part in the construction and servicing of aircraft. It saves time and insures better results on such important jobs as engine cleaning, operating pneumatic drills and hammers, tire inflation, greasing, dusting, blowing carbon, testing valves, cleaning ships, parts, etc. For the application of lacquer, special aircraft finishes and wing dope, it provides by far the most efficient method.

Brunner Equipment is built to furnish the dependable service which the aircraft industry demands. Models 854 and 868 are recommended for general hangar service. Special spray painting outfits complete with all necessary accessories are also available. Brunner engineers will cooperate in working out your equipment problems. Catalog No. 25 lists the complete Brunner line including spray guns, engine cleaners, blow guns, etc.

Brunner Equipment is sold by aeronautical and automotive jobbers. It is backed by the oldest and largest manufacturer of automotive air compressors in the world.

ENGINE CLEANING
with Brunner No. 78 Gun

SPRAY PAINTING
with Brunner Model 300 Gun

TESTING VALVES
with Brunner No. 35 Blow Gun

TIRE INFLATION
with dependable Brunner Air

MODEL 854
Completely Assembled Automatic Outfit. 2 H. P. motor, 8.7 cu. ft. displacement

AIRCRAFT DIVISION
BRUNNER MFG. CO.
UTICA, N. Y.

BRUNNER — AIR — COMPRESSORS
A WORLD'S STANDARD OF DEPENDABILITY

NEW·YORK·AIRCRAFT·SALON

MAY

EIGHT EVENTFUL DAYS

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MADISON SQUARE GARDEN

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AVIATION

THE OLDEST AMERICAN AERONAUTICAL MAGAZINE

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EDWARD P. WARNER, *Editor*

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Detroit . . . and Salesmanship

IN THE HOLDING of aircraft shows there are two distinct purposes, and when two shows of first rank importance are scheduled but a few weeks and a few hundred miles apart they naturally assume distinct aspects. A display of aircraft reveals the state attained by the art of design, and offers the engineers of the industry the opportunity of making concentrated revelations of the latest fruits of their dreams. Of more immediate importance to the stockholder, however, if not of greater fascination for the student of aeronautical science, is the commercial function of the display. An aircraft show is a show in the restricted sense of the term, but it is also a market-place. It takes the measure of public interest and of prospective public demand for the products arrayed upon the floor.

Most of the essential novelties of 1930 were offered to the public gaze in February, although some of stellar magnitude have been held back for their first display at the current show. The national significance of the Detroit gathering is not, however, primarily in the curiosities that it will unveil, but in the opportunity that it offers, the best so far presented, for gauging the sales prospects of 1930. We have recognized the necessity of finding a new public, and meeting them in a new spirit. The past few weeks have given some clues, to be gathered up and interpreted when the distributors and manufacturers come together at Detroit, to the spirit in which our new potential customers are going to meet *us*.

This week's show is ideally planned for the purpose. It comes when the season of intensive activity in the northern states has continued just long enough to provide an index of the extent and the nature of the interest existing among possible retail customers. It comes in a city recognized as one of the leaders in public enthusiasm for aviation and all its works. It comes, unlike all its predecessors, in a building integrally connected with a flying field, and it is but a few steps from the exhibition on the floor to the demonstration of the same machines in the air. That may be a dismal blow to the taxicab business, but it is a welcome innovation from the point of view of the seriously interested dealers, operators, and would-be private purchasers who will be on hand.

The proximity of the flying field, and the prospect that it will be used to somewhere near the limit of its capacity, create a very grave problem of traffic regulation. The management have prepared an exceptionally complete set of flying rules. As the minimum condition of safety, they must be adhered to. They should be enforced with merciless rigor if necessary, but no enforcement ought to be called for. Ordinary good sense on the part of the pilots should insure the most careful and minutely detailed observance of every field and air regulation.

Detroit's offering should be more a test and a demonstration of markets than a "show." Neither at Detroit nor anywhere else, however, will airplanes sell themselves. Merchandising is no less an art than design or production, and the student of aircraft salesmanship can learn both from the experience painfully and slowly accumulated in his own field and from the precedents of other related industries.

Because of the intimate relationship between the Detroit Exhibition and the problem of selling, we have devoted much attention in this issue of AVIATION to a survey of the merchandising side of the industry as it stands today. The topic is one that must be of universal concern if the industry is to progress in public favor. No one concerned with the aeronautical art, from the worker in a wind tunnel to the pilot on an air line, can be indifferent to the subject of selling. The future for all of us hangs upon the success with which the problems of principle and technique here discussed are solved in practice.

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And Now LET'S GET DOWN

William B. Stout, self portrait

◆

▶ *The airplane business is still in the hands of the engineer.*

▶ *This article is intended to stir up discussion.*

▶ *It probably will not fit in with the ideas of others, and most manufacturers will not agree with me.*

▶ *Their chief basis will be that it can't be done.*

▶ *The pilots will be the last to see it.*

▶ *The ideas do not conform in a business way to helping absorb present inventories.*

▶ *They outline considerable research and the spending of money before we come to the solution.*

▶ *Money is about all that we have in aviation so far.*

▶ *Let's forget the money for a while. Let the investment banker retire to Palm Beach with his spoils and let us—thankful for his departure—get down to solving airplane problems instead of allowing the banking business to bother us.*

▶ *Money never created anything yet!*

▶ *What we need now is to look around for some brains.*

▶ *Forget what has been and what is. Let's analyze what must be before we have a real aviation business. Then let's do it, and Behold!—Aviation!*

By WILLIAM B. STOUT
President, Stout Air Lines, Consulting Engineer, Airplane Division, Ford Motor Company

ILLUSTRATIONS BY THE AUTHOR

RECENTLY some seven hundred millions of dollars have been poured into aviation. Plane factories on every hand are attempting to get into production on this type or that. Schools here, there and everywhere are striving to graduate pilots as prospects for coming production. Aviation publicity and the pulic's belief in flying has gone forward with great strides and everything concerned with aviation has been booming.

But, the future of aircraft industry is still the responsibility of the engineer. Money alone never did and never will create anything. There is no use of going into production in quantities on a thing which the public does not want in the first place.

There is small sense to buildng a lot of planes with the market limited to those few who now know how to fly. Flying is too expensive to learn to attract the general public as yet. A lot of things must be done to the airplane before the private-owner industry is here and these things are up to the engineer to solve and not to the banker or the salesman, or the production manager.

No one, as yet, has built the private-owner plane, and by that I mean a plane that will fit the public—not just the pilot market.

The public is "The man on the street" who believes in aviation, who wants an airplane for his own use, whose finances and intelligence are average and who is just as ambitious as the millionaire. It is just as foolish to say that the plane will be only for the man of wealth, as it was when the Dodge Brothers made that statement to Henry Ford about automobiles. The automobile has created enough wealth so that now the public can enjoy motor transportation. Aviation will produce more wealth, but, nevertheless, present-day planes must fit present-day economics. This man on the street is not versed in aviation except that he has a "bug" to fly. He uses glibly such terms as air pockets, tail spins, air-mindedness without really knowing what they mean, if they really do mean anything. If this man ever flies, he cannot afford to go away to school for six weeks and spend $5,000 or even $1,000 to learn how to fly. He will expect to go to a factory on a Friday afternoon and fly his plane back home the following Monday morning. You may laugh at my statement, if you will, you in the industry, but until you do this and build a plane that is safe enough for him to fly home in, you will not have

TO *Work*

the industry for which you are looking. We can eventually make a plane fool-proof enough so that a man can solo in 5 hours and fly home in 10, with the Department of Commerce's entire sanction. As we engineers meet our obligation, we can rest assured that the Government will remove any restrictions to advancement.

THE DANGER of our present situation is too much money. This money is looking for dividends rather than progress, whereas the industry is looking for progress. The money wants production and sales. The industry wants better airplanes, engines, instruments, etc. The man with too much money will make his experiments on too large a scale: a man with only $10,000 to work with will experiment as cheaply as he can to conserve as much as he can and his mistakes will be small. The man with a million will make just as many mistakes but his will be on a larger scale. For this reason, the big firms can do less although first analysis would seem otherwise. We can take it for granted that the new things in the industry will come from small experimenters rather than factories and from enthusiasts rather than extreme technicians. So, the small experimenter in a barn in a back lot can take heart as having more chance of solving this thing than the technician in a million dollar laboratory. The new industry coming includes not only airplane and engine design and building, but sales, servicing, publicity, advertising, export, operation and whatnot. We all have wondered what will be the first step and how this thing can be carried on, but we have made small analysis of the conditions.

To date, we have revised the original Wright biplane by better engines and better aerodynamics and higher factors of safety, but we have not changed the materials nor the fundamentals. We have built no airplanes since the Wright as efficient per horsepower as was the Wright biplane. We are still building kites as kites are cheaper to build. We build square wings with ribs. We build fuselages and cover them with cloth for the same reason. Isn't it time we realized that at this stage of development, the great cost is not production, but sales. It is much cheaper to add a thousand dollars to the first cost of an airplane if you can save a thousand dollars in sales resistance, for you build up your volume so much quicker. There is only one way to market an airplane cheap and that is by not building a cheap airplane. We must first solve the problem of the plane and then make this good airplane cheaply by quantity of production. There is no other way. Those spending their time trying to make a cheap airplane have been and will be disappointed in sales, for the public does not want merely a cheap airplane. It wants the safest possible airplane at a cheap price.

In the new airplane design, therefore, sales is the first item to have in mind, even ahead of performance itself.

At the present time every member of the aircraft industry is seeking a solution to the problem of . . . What should we do, and how are we going to do it? If all expressions of opinion regarding that problem were placed end to end they would reach from here to there and back again. ¶This article contains the opinions of Mr. Stout, who, of course, needs no introduction to our readers. Whatever Mr. Stout writes is always worth reading, and digesting thoroughly. His views should prove of particular interest to engineers and manufacturers and other members of the aircraft industry who are struggling with the same problem.

The general public has an idea from cheap motor car methods that sales is handing to the public something that it does not want—hiring brass bands and parading with banners; giving away the product free on lottery tickets or in theater lobbies to get rid of production. It is history, however, that the great production of goods is of the best goods whose sales resistance is cut down by obvious quality—quality of material, of workmanship, quality of performance and in most cases, primarily, of appearance. In airplane work, we cannot force on to the public something that it does not want. We can not send a high pressure salesman around to the public's back door to shove a machine into the kitchen while the assistant rings the front door bell to get the lady-of-the-house out on the way until the machine is delivered. Those tactics have worked in the past with crooked methods of cheap products, but those days are over and would not fit our problem anyway.

FIRMS that have tried the cheap motor car method of sales and distribution of airplanes with pep meetings of dealers and much conversation and enthusiasm have left this type of plane sales sadder but wiser. Airplanes are a new product and something new is required to move them. The method itself must visualize something new or the prospect will not be convinced.

Here is a fundamental! When you read an advertisement, the eye translates the sense of the reading to the ear which translates the sense or nonsense of the ad, and sends it back again as a visualized picture to the optic nerve which carries the picture direct to the brain. Talk or printed word, therefore, has to be translated in one's head and, therefore, loses force and authority. If the eye can be immediately sold on a product without recourse to word or printed page, the mental decision is immediate and final.

We have already developed in civilization, what I have called "The Science of Eye-Appeal." This term is used because the ordinary word, to visualize this science, pictures to one only paintings on the wall of a museum or institute, or decorations in a millionaire's home—landscapes, sunsets, bowls of fruit, etc.—painted to delight the on-looker and with no other object in mind. What I am trying to visualize is this same science applied to putting "Eye-appeal" into our product. This science is ordinarily known as "Art."

The rules of arrangement of line, color, form, composition, perspective, texture, tone value, are just as definite as the rules of mathematics we engineers so glibly slip off the end of a slide rule. There is more guess work than in the mathematical branch of our engineering. If we want to build a theater, we build our art around practical facts of set arrangements and dimensions, light locations, pitch of floor, width and height of stage, color of lighting, location of spotlight, scenery colorings and the like. We aim to give the customer at the theater the greatest comfort possible both of body and eye and all of his mind may be concentrated on the play.

Details are ornate, decorative, involved, overdone (what we call chicken-gut art) for the reason that man does not have to live in this theater environment and he can, therefore, stand a great deal of decoration for an hour without being tired.

If we want to build a building for different psychological effect, we can arrange our art in lines, form, color to fit almost any requirement. If we want to make a man feel uplifted and "Spiritual," we give him a lot of high verticals in the building, dim distances, uncomfortable seats and a stage at the side instead of the center so that his neck will be twisted—and a rose window to rest his eye.

Now, why cannot we take some of this science which is so well developed in other sales lines and apply some of its principles in making our product look like something the public wants to buy.

The hardest thing to design into any airplane is that feature which makes a person stand in front of the product and say, "I want that." This eye-appeal is what makes an Oriental rug worth $5,000, when the one next to it of amateur manufacture and the same amount of wool can be purchased for $10. Let's get a little of this art spirit into our airplane business and if you ever see an airplane that has this appearance grab on to it, and develop with it, even though the interior may be Swiss cheese and tea lead. We know enough about the engineering to know that we can put that into the design, but we have thoroughly neglected to date the attempt to build something to sell the eye.

Once the eye is sold, however, we must see to it that the product in demonstration more than lives up to its appearance. If we are going to get this new public, we must have new performance both in safety, speed, climb, take-off, landing and maintenance. It cannot just be another Jenny or any hashed-over military design.

In striving for this, however, there are three things we must keep in mind. First:—*What safety demands.* Second:—*What the public demands.* Third:—*What performance requires.*

IN THE FIRST DIVISION of safety it needs no argument that structure must be strong. No matter how good an airplane may be aerodynamically, if the wings come off when it goes up into the air, it is not an airplane. Strength even stronger than our present Department of Commerce safety requirements must be built into planes in order to keep down the cost of maintenance.

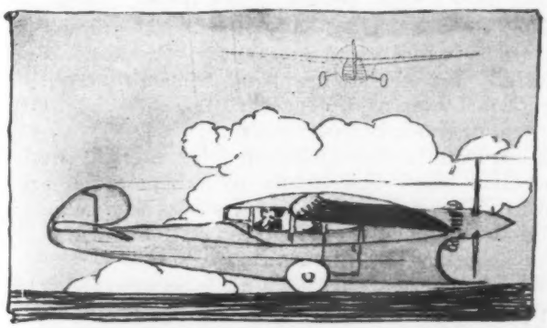
After this basic necessity of structure comes vision. Vision in present-day planes is always a source of real wonder to a man on his first flight, he cannot understand why planes are made with engines, propeller and other obstructions directly in front of the pilot, entirely obstructing front view of the field in landing. If one had to drive an automobile by watching the side of the road, he would quickly change the design.

Many disagree with me on the importance of this, but as airplanes get more and more into the air in numbers, vision will become more and more of basic importance. It will be necessary, also that this vision be standard for all planes. One of the greatest dangers now of flying around airports is of collisions, where one plane can see up and not down, whereas the other plane can see down and not up. The plane below is likely to climb into the plane above without seeing it, or the plane above is likely to land on the plane below without seeing it. It is my belief that a direct forward vision will soon be a requirement of the public on all airplanes, the same type of vision that they now have in an automobile or glider. One can take a glider, where the pilot sits out in front, with nothing ahead of him, coasts off a hill and make a respectable landing the first time he ever tries. The vision is what he is accustomed to and as he approaches the ground he naturally pulls back on the stick at the proper time. If we could eliminate the present engine and propeller in front of the pilot, giving him clear vision at a distance from the ground to which he is accustomed in an automobile, it is my belief we could cut at least two

hours from the training period of the average student pilot on landing. As soon as the air gets full of planes this vision will be necessary.

The next thing which safety demands is controllability. This is vastly different than mere stability. This has been pointed out as the difference between a tricycle and a bicycle. The tricycle has stability, but will not go where you want to steer it, unless the ground is level. The bicycle has controllability and once in motion you can make it go wherever you want, side hill or not. It is perfectly easy to make a stable airplane, as we know, but it would follow every guest of wind. What we want is a plane which will sit down where we sit it down, whether the wind be from the side or any other direction.

Another item of controllability is, in a stall. Coming into land is a critical moment in aviation. If one is overshooting his field through misjudgment, or otherwise, the pilot either must side slip, or stall the plane in. The latter is the better and safer way, provided the wing curve is such that the lift does not bubble out suddenly as in the thin winged European, and American Military types. The wing curve of lift should show a flat spot at from 16 deg. to 20 deg., or the equivalent, so that there is a wide angle of attack available to the pilot at a stall and particularly to the student pilot, to take care of faulty judgment and lack of experience. This gives him a greater period of time to get the feel of the plane as he comes in. When he levels out for a landing he should know that support will not suddenly leave him and that when he stalls in he still has enough controllability in the ailerons to keep from going into a spin, no matter what gust of wind, or unexpected happening



Any freak arrangement of good units is worth trying

may occur. This type of wing curve should save another hour in the length of time before solo for the average student, where one is teaching him only to fly this particular machine, as in the case of a prospect, or customer.

Now, if we can fit to this machine a super-landing gear, capable of taking shocks equivalent to a flat spin landing, we can still further reduce this student time. Very recently with a new type landing gear and Musselman tires, we pancaked a two-seater from 25 ft. to an angle of about 45 deg. with no more shock to the plane than a normal rough landing with the old type wheel and gear. With such a fitment a student pilot could safely come in and land, purposely leveling out three or four feet from the ground and land, until he gets accuracy enough to do better and better. As soon as he can make even pancake landings from normal height, he can solo without danger.

It is my opinion that safety also demands closed cabins, if we are to do all year around flying. Like David, no man is at his best in a fur lined flying suit, helmet, mittens, galoshes, goggles, etc. Not only can he fly better in the cabin, but the cabin itself and a proper heater will weigh less and allow better performance than the weight of the flying suit, etc.

Now we come to what the public will demand. Whether they realize it or not, appearance is the first sales factor. If the plane does not look safe to them, they would rather someone else try it out first. This appearance, so far has barred out the pusher type plane, even though the extra efficiency is admitted. It is hardly possible that the out-rigged type of plane will impress the purchaser as a personal type. If we can make a tail first plane, allowing a fuselage, appearance might be had.

NATURALLY the public wants comfort; this means fully closed cabins. The public does not want tandem-seated planes carrying two, any more than it would buy a two-seated automobile built the same way. If a young man is flying out with a young lady he does not want her sitting away in back where he cannot talk, or cannot point out the things of interest along the way and is absolutely devoid of any sociability on the trip. The public will demand side-by-side seating, with some provision arranged, however, so that the passenger in an emergency cannot grab the arm of the pilot and be a spasmodic cause of disaster.

Probably last on the list which the public will demand is reputation for safety. I would use the word safety, but as yet the public does not want what safety consists of in an airplane (nor, in fact, does the engineer), but a plane must have a good reputation before the sales resistance can be minimized, so that the public will have a basis of real belief in their security.

Finally we come to those things that performance demands. First: is light weight in both plane and the engine. I mean by this, light weight per square foot of wing and light weight per horsepower of engine. For this private-owner plane with our present performance, we should have at least 50 hp. per passenger and for a private-owner plane a wing load of not over 10 lb. per sq.ft.

Second to light weight, comes low resistance, or minimum parasite resistance. The private-owner plane of the very near future will of necessity have to have a cruising speed of at least 100 m.p.h. If we give this plane the smooth contours necessary for high speed, fold up the landing gear, enclose the engine, etc., then we have made a "floater" which may very easily get a beginner into difficulties in overshooting his landings. There should be arranged, therefore, for such a type of plane some kind of parasite resistance to be extruded from the plane to kill the lift-drag ratio and help him to stall in from steep angles over trees in small spaces.

Finally the three fundamentals that I want to leave particularly as effecting sales at the present time are:

First: *Appearance*—We are not giving the public what it wants in design.

Second: *Cost*—We have been trying to build cheap planes, instead of striving to make the best possible plane cheaply.

Third: *Performance*—Such as to cut out the major risks and time requirements of the student pilot, before the purchaser can fly his own plane home.

WHERE IS MY *Wandering Market*

A well known private plane owner Ken Maynard and his Travel Air

SPEAKING GENERALLY, the American aeronautical industry is divided into two classes of members . . . the optimists and the pessimists. However, between these two extremes is another group, a very small group, composed of people who are keeping their eyes on the ball and are neither optimistic, nor pessimistic regarding the results of their efforts. It is that group, and the ones who fall in line with them, that our children's children will have to thank for placing aeronautics on a profit paying basis.

When Lindbergh went to Paris the aircraft industry in this country became a group of raving optimists. And then in the course of the next three years the Order of Aeronautical Pessimists and Kill-Joys was inaugurated. The slump of 1929 sent many of them down out of control, and today they go to shows and other aero functions with faces a mile long, and nothing but sad words for the future. The ones who retained their membership in the Society of Aero Optimists and Hot-Air Artists are still raving as of yore, if not from the force of habit, then because they fear that the public will drop its interest in aviation entirely.

The third group, which might be termed the Hard Boiled, Level Headed Aero Business League, is neither long of face nor raving. It is rolling up its sleeves, collectively and individually, and endeavoring to apply intelligent effort to the task of making money.

And that is just why we are all in aeronautics . . . to make money. We may be in it because it's our first love . . . we may be in it because it's an attractive hobby . . . or we may be in it because of necessity. But everyone of us is in it to make money, if we can. And so, the optimists talk in terms of millions and work in terms of nickels and dimes; the pessimists moan only in terms of bills and red ink; and the hard boiled, level headed ones think and work in terms of future progress.

The problem, then, is what is to be done, and how should it be done. For the sake of clarity and controversy let us regard the situation as the Hard Boiled Level Headed Aero Business League undoubtedly views it.

We have developed a new and wonderful means of transportation. Regardless of all other comparisons that might be made, it is at least the fastest mode of commercial or private transportation in the world today. In our opinion, it is safe, it is efficient, and it is adaptable to the daily life of the man in the street. That man in the street, however, does not agree with all of our views. He marvels at the performance of the airplane. He appreciates its capabilities. But he and other members of the majority of men in the street do not consider it necessary to their daily life in either a business or pleasure way.

Why? . . . that is the problem . . . the question that must be answered satisfactorily.

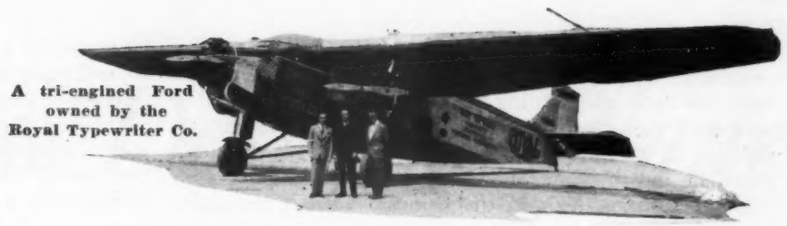
Is it price? Some say yes, others say no. Airlines have slashed rates to a point where they equal railroad rates, and traffic has increased enormously. Perhaps it is price, after all. Yet on the other hand, some airline operators report that even with reduced rates only about fifteen per cent of traffic is repeat business.

Some manufacturers have cut prices on their products. Cut them below any chance of profit in the present market. They believe that quantity sales will make up the difference eventually. Perhaps so . . . but when? And what about the time in between?

We often hear comparisons made between the price of airplanes and the price of automobiles. And with much emphasis upon the fact that airplane prices are considerably more. Is there any logical reason why they should be less? Is not the purchaser getting more for his money in both quality workmanship and performance? When the man in the street changed from the horse and buggy to the motor car he paid more as initial cost, and he paid more for maintenance. In the airplane he secures an even better method of transportation for pleasure or business. Why then should he expect to pay less?

Naturally it follows that quantity production *and sales* will reduce manufacturing costs so that F.O.B. prices will also be reduced. But why insist that the price should be at least equal to, if not less than, the price of the method of transportation that surplanted the Old Gray Mare? Certainly there is a difference in price between a rowboat and a motor boat, and neither department of that industry is suffering because the public does not appreciate the difference in product utility for money received.

Therefore, it would seem only logical to impress those facts upon the airplane prospect. Convince him of the superior workmanship, convince him of the superior per-



A tri-engined Ford owned by the Royal Typewriter Co.

TODAY?

By R. Sidney Bowen, Jr.
Associate Editor of Aviation

formance and convince him of the increased value and utility for money received.

All of which sounds very nice until one asks the question . . . who is the prospect, and where is he?

If we knew, we would gladly send name, address and telephone number to all reputable aircraft manufacturers. That however, is the task that looms ahead. The point at issue though, is that although quantity production and sales will reduce prices, we must face the fact that we have not got quantity production and sales at the present time. What are we going to do about it? The answer would seem to be that if it must be a case of hand-picked selling, then hand-picked selling it is. If we must sell our product for five thousand dollars in order to make any net, then let's go after people with five thousand dollars.

It is unfortunately true that the industry has made many merchandising mistakes since Lindbergh's flight. Some of them were unavoidable, others were not. However, each mistake taught its own particular lesson, and out of all that will come future progress for those who keep hammering. The industry is not up against a brick wall, neither is it hitting on all six. ¶*This article which deals with past mistakes, and their effect, does not attempt to offer definite solutions of the many problems that confront the industry. It merely suggests, by comparison with what has gone before, methods of attack which in time, might lead to possible solutions.*

There are plenty of people in this country who can afford what the modern airplane costs. The trouble is that we have made only a half-hearted effort to search them out. Let's put a little business into this aviation idea. If the market appears to be restricted for our product, let's do some market research and some market analysis. How many people in Texas can afford the price we ask? How many have a need for what our product will give them, etc., etc.? How many in Maine, New York, Kansas, California, and the rest of the 48 states? We do not know. Well then let's find out. Let's determine the market in figures . . . accurate ones, not guess work. If we can't do it, then let's employ someone who can. If we are a big combine then let's set up a research department and acquire all that valuable information. Then when we get it, let's go out and comb to the last prospect. But the idea is, let's unearth and develop the market that can afford our product, *and* the market whose needs are best filled by our product. If the Jones Company is selling the less wealthy man next door a cheaper product let him go ahead with it. Let's stick to our market . . . in short, stick to our knitting.

Do we need dealers and distributors? Maybe yes, maybe no! But at any rate let's not get the idea that a distributor and dealer organization loaded up with our products means that we are building up sales volume. It doesn't! It merely means that we are getting planes out of our factory. Selling only 100 planes to satisfied customers means more to the future of our business than 1000 planes in the hands of distributors and dealers.

A Fokker Super-Universal operated by Fox Movietone

And, as to our product. We honestly believe that it is very fine. It probably is, but have we really and truly tried to convince the public of its quality, and more than that, of its utility? We've made all sorts of world records, we've made all sorts of trick flights, and we've made the public go out in the rain to buy a paper and read of the wonderful things that our product has done. And now we tell that public that it should ride in our product, that it should buy one. The public perhaps considers for the moment, and then one of our products spins into the ground and there is no sale. Why? Because we've been hammering on aero glory and not aero utility.

And when we come right down to it, have most of us really made any attempt to give the man in the street an airplane he wants? We have nôt! As a matter of fact

many of us have totally disregarded the desires of the customer. What we were doing was making airplanes with one hand and holding a searchlight on our competitors with the other. If he put pants on his wheels, so did we. If we faired in the wing stubs and got 3 m.p.h. more, he did the same thing and claimed 4 m.p.h.

Competition is the spice of business. That is, the right kind of competition. But has aeronautical competition brought about the best results? In a way, yes. We have higher speeds, quicker take-off, better climb, etc. But haven't we sacrificed the desires of the customer to get those added "features"? In short, have we really made an effort to find out what the customer wants in his plane? And, perhaps, better still, have we tried to tell him, to show him, to prove to him what value our product will be to him, other than to whirl him through space between two points in the fastest time now possible?

THAT THROWS the light of inquiry on our advertising. We've spent thousands on advertising in all of its various forms. We've tried to do it ourselves. Then some of us turned the job over to a 19 year old high school graduate. And after that we tried agency after agency, and we are still dissatisfied. Why? Perhaps it is because we have failed to realize that commercial advertising is an art in itself. That it is a powerful sales weapon that when misused can be just as harmful to sales as it can be helpful when intelligently used.

Perhaps the advertising agency to whom we first gave our account was not as well versed in aeronautics as we were. But it probably *was* exceptionally versed in merchandising. And so was the second agency, the third, the fourth, etc. But we, riding on the crest of a sales boom wave, naturally figured that sales from advertising were but a matter of course. When the decline came and sales dropped off we immediately put it down to ineffective advertising. We tore into the agency, and still sales kept dropping. Then we withdrew the account and took it elsewhere. The same thing happened, and we continued to bat our account around like a ping-pong ball. And what really was the matter? It was an inevitable decline that all the advertising in the world could not have stemmed. The agency was really doing a good job for us and we couldn't realize it. The agency was building up a name, pounding at logical markets. But what we insisted upon were results on the first pound. We didn't get them, but has any other industry been that fortunate? The answer is no. Advertising is a sales weapon that takes time to show results. Quite often it is impossible to trace results to advertising. Yet it is an essential part of selling that has got to be worked continually. It is a common business mistake to begin economy by cutting advertising costs. If the advertising is well handled, every dollar cut from the budget automatically becomes one dollar's worth of sales resistance to be overcome.

In short, if our agency is applying itself let's give it a fair break. The agency is a group of market specialists. We are a group of engineers and manufacturers trying to do everything. That in itself is good reason why we should seriously consider the inauguration of a research department. Let that department work with the agency. Let them both conduct surveys, analyze market conditions and possibilities, and co-operate with our sales organization. We couldn't possibly have any better contact with the man who signs the dotted line. He is not at our front door now. We do not know where he is. Research and advertising will seek him out and catch his eye. Our sales force will convince him, and another of our products will be owned by a satisfied user. That and the service which we will place at his command is what will build for repeat business. Repeat business, perhaps our best asset.

Incidentally, our own sales organization is an item that we have not considered as seriously as it might have been considered. We all know that we have been in a buyers' market, not a sellers' market. That, of course, was due to the well known fact that there was no market outside of our own industry. Therefore, a lot of us slipped up a bit on our sales organizations. We appointed distributors and dealers in hit-and-miss style. We hired salesmen by the car load, as it were. Territories were allotted without much thought, and everyone was loaded to the roof with our products. We do not need to discuss the results. We know perfectly well what they were. We did, however, learn some valuable lessons. Next time, in fact right now, let's hand-pick our distributors and dealers if we finally decide that they would be more advantageous to us than our own factory branches. Let us also hand-pick our salesmen. Let's take the time to train them if we must train them. But at any rate let's get *salesmen* and not pilots with a good line of chatter. First class pilots they may be, but that qualification does *not* necessarily make them good salesmen.

IN SUMMARY, we are making a good product. We shall continue to increase its value to the owner. It may be that the future will find us making a plane entirely different to the one we are making now. The market will decide that for us. But just now what we want are sales for the product that we are making. Sales for a product we know is good, is worth the price we ask, and is suited to the needs and requirements of its market.

It will take time to build up those sales, for we must first unearth the market for which our product is best suited. And then we must develop that market by means of commercial education backed up by the quality and performance of our product. And when we speak of time, we do not mean next week, next month or next year. It is true that the boom hit us over night, but booms are like that. However, the task of building up increasing sales volume is a horse of another color. Particularly in view of the fact that we are really starting from scratch in this business of selling aircraft products, and keeping them sold. What sales figures we have, are really not of much use to us. They were set up during gold-rush times. We do not even know what normal sales levels are in this industry of ours. We will know in time. How long, is something that is strictly up to us.

And to accomplish all that will cost money . . . a lot of it too. But we have money in this industry. It may be controlled by persons who must first be shown. Then let's show them, not by pretty talk, publicity performance stunts, and wild cat ideas, but by sound, practical business plans. And let us not be miserly in spending that money, yet let us be wise. At present most of us have a great desire to slash expenditures left and right. Let's think twice about that. We are at the low level just now, and many times that is *just* when we should untie the purse strings and spend the money.

Research and education make up the task that is ours. It is no time for optimistic chatter. It is no time for pessimistic wailing. Neither the death-knell nor the trumpets of victory for commercial aviation have been sounded. It is the time to apply cut and dried business methods to a cut and dried proposition. So, let's go . . . contact! . . . more intelligent thinking and work, and less talking and running around in circles.

SELLING THE *De Luxe Plane* MARKET

By C. W. WHITE
Vice-President, Bach Aircraft Company

Interior view of the cabin of a custom built Bach

WE OF THE INDUSTRY have always tended to be a bit romantic about this aviation business, and have too often treated the job of selling airplanes as an avocation, rather than a bread and butter vocation. Our general tendency during the years in which aviation has been growing up, was to fly and get others to fly, let the money take care of itself. During the past two years organized capital has stepped into the picture and invested so heavily as to change the entire complexion of aviation. From a picturesque aeronautical movement of uncertain financial status, aviation has been changed into an established business enterprise whose only legitimate excuse for existence, whether we like it or not, is to earn profits and pay dividends. Therefore those of us who hope to remain permanently connected with the manufacture, sales, and operation of aircraft must have profits as our primary thought and motive at all times, and every move that we make must be calculated to place more black ink on the balance sheet.

At the present time the industry is more or less cursed with a situation of "spotty" development. Certain types of planes and certain sales methods have been exploited beyond reason while other planes and methods have been almost completely passed by. I say that the industry has been "more or less" cursed by such a development because it is evident that, while aviation as an industry is not well rounded out and evenly developed in all of its branches, those companies which seek out the unexploited phases of the industry and apply their major effort to the development of such, will thereby profit very considerably. At the same time they will be performing the patriotic and commendable function of assisting an overgrown infant industry to mature in a normal fashion.

Although the uneven development of the aviation industry is self evident and hardly requires illustration, there are outstanding examples of unexploited fields. One of the most striking is that of the glider, now growing more popular every day and the development of which bids fair to be of real commercial importance as an integral portion of the industry and also as a factor in general aeronautical development. Yet the glider has been permitted to lie dormant for a full twenty years. Another example is the transport field where millions of dollars have been spent to develop air mail and passenger flying while very little attention has been given to the promotion of aerial express carriage, which now promises to be the major profit producer in the air transport field. In the field of aircraft design and manufacture we have had planes of almost every size and type developed from an *engineer's* or aeronautical architect's standpoint, but a very real lack of effort to build for the requirements of the *individual owner.*

Aircraft manufacture has been very heavily devoted to the transport and training type of plane, so that the market is now overcrowded with these types, but there has been a singular lack of development along the line of de luxe aircraft especially designed and custom built

According to Mr. White . . . "The de luxe market is not the biggest but we think it is one of the best, especially at the present time. We intend to build and sell consistently to this market, with the prospect of making a fair profit on each individual plane sold, and we believe that several other manufacturers will do well to specialize in this phase of the business." ¶In this article Mr. White states his views on the problem of "who and where shall we sell during 1930," and puts forward his reasons for favoring 100 per cent concentration on the de luxe market.

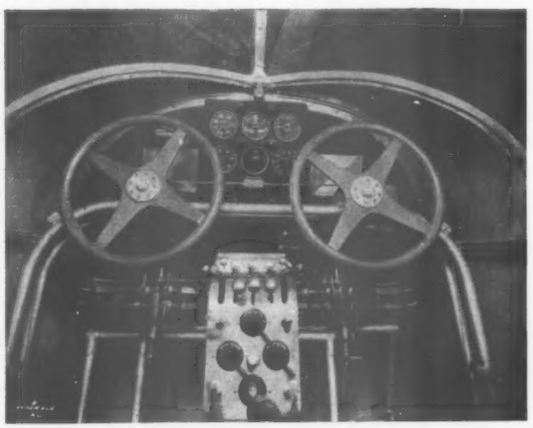
to the requirements of those who can afford to pay for the fastest and most luxurious form of transportation. Outstanding exceptions have been the de luxe craft developed by Sikorsky and Loening, the executive models placed on the market by Lockheed, Ryan and some others, and the custom built air cruisers now being marketed by the Bach company. It is this latter type of plane that we of the Bach company feel holds the greatest promise of profits outside of the more heavily exploited fields, provided that an efficient sales plan is coupled with the manufacture of such a plane. For the benefit of aviation in general we feel that the development of miscellaneous flying of the quality type, featuring de luxe air cruisers which safely transport the leading people of the country about on business and pleasure jaunts, will do more than any other sort of miscellaneous flying to sell aviation to the general public.

AIRCRAFT will surely cover all the phases of transportation already engaged in by surface craft, either land or water. Just as the freight boat, train, or auto truck has been widely used as a freight carrier, so we are finding increasing application for aerial freight carriers for handling the mails, express, and many types of commodities. We have transport and taxi planes just as there are transport auto busses, and automobile taxis; limited passengers trains and short haul interurbans; ocean and coast-wise liners and cross-channel ferries. The one phase of aerial activity which has been least developed is that which would fall in the same class with the cabin express cruiser on the water and the Rolls-Royce, V-16 cylinder Cadillac, and other custom built de luxe automobiles an land. Airplanes of a certain type are adaptable to the most luxurious and most efficient transportation, and it is this transportation that many wealthy people, who can well afford the best of everything, are now ready to adapt to their own uses. The average travelling man will be riding the established air transport lines in tremendous numbers before the close of 1930, but the big executives of the country will find it to their advantage to cruise from East to Mid-West, or from Coast to Coast, in luxurious air cruisers, just as they now cruise from New York to Miami, or New York to Boston or the Maine coast in their water cruisers.

The business advantage of being able to combine work with pleasure through an aerial cross country cruise with several customers, or with his immediate family and servants aboard, with all their baggage, is going to lead the business man who can afford it to provide himself with an air cruiser for his business trips. Even though he uses his air cruiser but once a week the business man will find the expense of maintaining it at least as justifiable as the cost of maintaining a water cruiser which can at best be used only where there is water available. A recent conservative survey of the cabin cruisers in use in this country costing $30,000 or more shows that there are at least 3,000 such boats. We believe that this year will be featured by sales of de luxe aircraft to wealthy private owners and while we cannot hope to sell a plane to every owner of an expensive boat, the fact that there are several thousand such men indicates that the field for such aircraft sales is far from restricted. A conservative manufacturing program and intelligent merchandising plan should make it possible to sell several hundred aerial cabin cruisers a year at a very handsome profit to the manufacturers who specialize in this market. There is every indication that the eventual use of such aircraft will far surpass the use that has been made of boats of a similar type, because of the vastly wider possible application and greater inherent utility of the airplane.

In this connection it is interesting to note the sales record of one leading Western aircraft distributor, H. C. Lippiatt, Travel Air distributor for the Pacific Coast, who specializes in sales to moving picture people. During 1928 he sold 59 planes with an average unit sales price of about $3500, yet during 1929 he jumped the unit price average to more than $10,000 on a sales volume of 32 planes through sales of de luxe cabin planes. While the bulk of his 1928 sales were in the light sport and training plane class, he disposed of eight planes costing $20,000 or more apiece during 1929. The experience of this distributor seems to show the trend of the market, and we are finding the sales response from men of wealth to be most optimistic. A further encouraging factor is that a rather substantial proportion of the young men who are now taking flying instruction are in the class of those people who devote much time to yachting and polo. Such men will either themselves purchase such aerial cruisers as we are now producing, or will influence their families to add such equipment to the other transport facilities.

The aerial cruiser must, of course, have first a chassis par excellance. The plane that is to be custom built for luxury travel must first be airworthy and of proved performance in every respect. Just as the owner of a cabin cruiser on the water, or the custom built car on land, expects to be able to negotiate every conceivable condition with better performance than the less pretentious boat or car, so the man who buys a luxury airplane wants to be sure that he can outspeed other planes, and if necessary fly through or over conditions where other planes must remain on the ground. For that reason we think it essential that the luxury plane be multi-engined, extremely maneuverable, and of superior performance.



Controls and instruments of a made-to-order Bach

Building up from this proved and superior chassis it should be the aim of any company catering to the luxury field to custom build the airplane into the most distinctive craft, both inside and out, that can be produced. Such work requires the cooperation of the aircraft architect, upholsterer, interior decorator, and artist. More and more the women and her artistic tastes will enter into the requirements which the custom built plane must meet. Our luxury plane must be both distinctive and tasteful, and the interior should be the last word in comfort.

A feature which we consider most important is that there are no instruments in the cabin to remind occupants that they are in an airplane. We believe that the plane owner will be better satisfied to employ a pilot upon whom he can depend to take the plane where directed without any attention on the part of the passengers, and that those engaged in the trip should be no more interested in the air speed indicator than is the tonneau occupant of a car interested in the speedometer reading.

IN SELLING such planes we think the prime objective should be to sell one plane at a time and to make money on each plane sold. In other words to be conservative, and at the same time throughly sell the present market. It is quite essential to determine the rating of the prospect for an aerial cruiser and not to waste time on those who cannot afford to support a luxury of this nature. There are already enough wealthy persons who have been sold on aviation in general, that we would probably best concentrate all of our sales efforts on those people who believe in airplanes as a means of transportation, rather than extending our sales efforts out among the vast number of people who may have money enough but who have no inclination or desire to own an airplane.

It is a relatively easy matter to determine whether a prospect is really a lover of airplanes and whether he is financially able to undertake such a purchase. Once these points have been determined no reasonable effort or expense should be spared to sell that particular prospect upon the advantage of an aerial cabin cruiser.

Wherever possible the Bach Company has followed the practice of studying the live prospect and determining his transportation habits. At every opportunity a Bach plane is placed at his disposal in connection with a business or pleasure trip where the advantages of owing a private airplane can be well demonstrated. A regular procedure with our sales organization is to organize a party of prospects and take them for an evening flight out to Palm Springs, a desert resort beyond the Sierra Nevada coast range of mountains and with an atmosphere worlds apart from that of the city so quickly left behind. In a short flight of one hour the prospect is carried smoothly and in the utmost luxury, on a trip which would require several hours by any means of surface transportation. By setting him down in a new world of desert and mountain, yet in a resort offering every luxury, the prospect is shown the unapproachable qualities of the airplane as a means of personal transportation. The night demonstration, with the knowledge that three engines will insure uninterrupted flight to the point of destination, serves to further enhance the plane in the eyes of the prospect.

Because the field of purchasers of the custom built air cruiser will always be considerably more limited than that of other classes of aircraft, we believe that a distinctive sales method should be followed. It is a peculiar fact that the purchaser of expensive custom built vehicles, whether land, water, or air, takes particular delight in having a direct factory contact. He likes to give orders to the factory direct and have them carried out to his slightest whim. He feels that he is paying a considerable amount of money and in return he wants the entire factory to bend every effort to please him. This situation minimizes the desirability of dealers and makes it more logical to conduct sales direct from the factory through a few factory branches or well established distributors in the larger centers. The service problem is eliminated because owners of such equipment usually send it back to the factory periodically for rebuilding or refinishing, while engine service is available throughout the country on any of the leading makes of power plants. Therefore we try to have all prospects go through the factory before buying so that we have "face to face" contact right at home.

We can show the prospect every detail of the plane's construction, selling him first upon the utter depenability of the product and upon the reliability of the factory in general. From there it is an easy step to work with the prospect in planning the plane to exactly meet his specifications, so that when the sale is made we can be sure it will be entirely satisfactory upon delivery. Such a sales plan does not involve an extensive organization, and logically results in some form of dependable representation in the leading centers of the country, which representation may not be either an actual distributor or a factory representative. In many cases it is possible to make an arrangement with men in other lines of work to keep us posted as to sales possibilities in their territory and to arrange for actual demonstrations by a factory representative touring in a demonstrator plane. If a sale is made the local man is rewarded with a liberal commission. There are, of course, many details of selling that work in with such a plan; such as commissions to pilots who uncover prospects; and the practice of giving all licensed pilots an opportunity to fly the plane, whether or not they may be prospects. This latter point is quite important in all fine plane selling because many men of wealth go directly to pilots for advice before actively considering the purchase of an airplane.

Inside a de luxe Bach looking toward pilot's compartment

As we view the present and probable future aircraft market, we vision our company, and others catering to the custom built private air cruiser class, as filling in a very real gap in the completely rounded out industry—producing and selling shoulder to shoulder with the companies in the training plane, sport plane, business plane, or transport plane markets, but actively competing with none of these other divisions. We think that the most beneficial thing which can be done at the present time to help both the entire aviation industry, and each individual unit in it, is for all units to analyze the entire field and to specialize in that particular phase of manufacture and marketing which promises profits on each vehicle produced, while at the same time serving to round out the complete aeronautical industry.

THE *Packard Diesel* AIRCRAFT ENGINE

By EDWARD P. WARNER
Editor of AVIATION

THE DETROIT SHOW brings the Packard Diesel aircraft engine into the light of day. Both upon the Packard Company's own stand and installed in a number of airplanes by different manufacturers, it will be open to the examination of the visiting public.

For two years its details have been a well-kept secret. Early in 1928 its existence was gossiped abroad. In the summer of that year official report was made that it had flown as the power plant of a Stinson monoplane, the first occasion of an aircraft driven by an engine without electric ignition. Late in that fall, and again within the last few weeks, the writer was privileged to ride behind it. In December Capt. L. M. Woolson, the designer, gave a broad indication of some of the engine's general characteristics in a talk before the Society of Automotive Engineers in Chicago. In May, 1929, it gained public attention and the headlines once more when it was sent upon its first cross-country trip, carrying Captain Woolson from Detroit to the annual field day of the National Advisory Committee for Aeronautics at Langley Field. In April, 1930, it is formally unveiled.

In general appearance and in general behavior on the dynamometer stand or in flight the Diesel is in no vital particular dissimilar from the radial air-cooled electric-ignition gasoline-fed engine that it replaces, except of course for a change in the form around the cylinder head and for the absence of most of the conventional accessories. The Packard engine at its present stage of development, the model which is to be on exhibition at Detroit and which has recently received the Department of Commerce Approved Type Certificate, is like the familiar Whirlwind and Wasp, the standard air-cooled types of the time when the Diesel was undergoing its early development, in being a nine-cylinder radial. Like the J-5 nine-cylinder Wright, the only conspicuous small radial in use at the time when the Packard engine was first put into the air, it develops 225 hp. under its normal rated conditions. Normal speed is 1,950 r.p.m. Weight 510 lb. Thus the engine weighs 2.26 lb. per hp. On the occasion of taking the power curve reproduced herewith the rated power was exceeded by about 10 hp.

To get that output the cylinders have been given a bore of $4\frac{13}{16}$ in. and a stroke of 6 in. The piston displacement is therefore approximately 980 cu.in., the power output 0.230 hp. per cu.in., the brake mean effective pressure 94 lb. per sq.in.

Capt. L. M. Woolson, designer of the engine, and Walter Lees, test pilot, before the Diesel-engined airplane

The over-all diameter of the engine is 45 in. It happens that the power, weight, and over-all diameter are all within two per cent of being identical with the corresponding figures for the J-5. Both the bore and the stroke in the Diesel are, however, somewhat larger than in the comparable gasoline engine, the piston displacement being 25 per cent greater and the mean effective pressure considerably lower. The exceedingly small clearances used in a Diesel engine and the simplicity of the valve gear of course help to keep the over-all diameter down for a given stroke.

There will be few readers of AVIATION for whom

Installation in the Waco with exhaust manifold

A Nine-Cylinder Radial Engine of Compression-Ignition Type Developing 225 Hp. on a Weight of 510 Lb.

there is any necessity of summary of the Diesel principle, but those who have had no recent contact with, or occasion to give thought to, the type may be reminded that the essential feature is the elimination of electrical ignition apparatus and the firing of the explosive charge by the heat of compression alone. Compression ratios must, therefore, be exceedingly high to insure that the temperature due to rapid compression of the air in the cylinder will be above the ignition point of the fuel and will consume it as rapidly as it is sprayed into the chamber above the piston. Theoretically, in the ideal Diesel cycle, the combustion takes place just rapidly enough to keep the pressure constant as the piston descends for a substantial part of the stroke and until all of the fuel for that stroke has been injected. In practice, there are considerable departures from the ideal, especially on high-speed Diesels, just as high-speed gasoline engines show large deviations from the ideal Otto cycle, with combustion at constant volume while the piston is on or just past the top dead center.

Of the numerous problems that has beset the designer of high-speed Diesels in the past, the most serious have been to control the inflow of fuel so that it would be evenly and completely consumed in the infinitesimal space of time available and at precisely the right point in the cycle, to provide satisfactory flexibility characteristics, to secure easy starting, and finally, and for aircraft work most important, so to harmonize mechanical design with the thermodynamic characteristics of the engine as to keep the weight within reasonable limits. Captain Woolson, with the aid of Dr. Hermann Dorner, who came to the work from a long Diesel experience in Germany, has at least in a very considerable measure solved those specific problems.

To the specialist in Diesel problems much the most striking feature of the Packard engine is the very high maximum pressure permitted in the cylinders. There has been a widespread belief among students of the type that satisfactory results for aircraft work could only be secured by keeping the maximum pressures, and the consequent stresses, to comparatively low values. It is with the development of low-pressure Diesel operation that the work of the National Advisory Committee for Aeronautics has been most largely concerned. Pressures of 500 to 800 lb. per sq.in. have been commonly discussed. In the Packard the design is based upon maximum cylinder pressures somewhat in excess of 1,200 lb. per sq.in.

General Operating Cycle and Conditions

The general thermodynamic characteristics of the engine can be best described by following through the cycle of operations, which to be sure is in general common to all Diesel engines for all purposes, but with the specific figures and facts inserted to apply to the Packard model.

At the beginning of the intake stroke the piston is at top dead center and the cylinder is very nearly evacuated, for the compression ratio of 16 to 1 allows a clearance space of only about 7 cu.in. in each cylinder, or a mean clearance height above the piston of about three-eighths of an inch. With the piston in that position the valve (it is a notable feature of the design that there is but one to each cylinder) is open to the surrounding air. As the piston moves downward air is sucked into the cylinder, precisely as the explosive mixture is inhaled through the intake valve in a gasoline engine. Thirty-five degrees past bottom dead center the valve closes, and the air in the cylinder is compressed as the piston moves upward. So far there is no change of the course of events characteristic of a gasoline engine, except that the cylinder is filled with pure air instead of an explosive mixture of air and gasoline vapor. The compression ratio being, as already noted, 16 to 1 and the compression being nearly adiabatic, the pressure in the cylinder rises to about 500 lb. per sq.in. and the temperature of the air to approximately 1,000° Fahrenheit by the time the piston has reached the upper limit of its travel. Before that time, however, about 45 degrees of crankshaft travel before top dead center to be exact, the tappet that oprates the fuel pump (of the details of which more later) starts to force the plunger upward in the pump. The fuel which the pump chamber contains is then forced out into the working cylinder in a fine spray, which immediately ignites, as the temperature of the air is above the flash point of the fuel.

As already indicated, the ideal Diesel cycle calls for the injection and combustion of fuel to start at top dead center and to continue for a substantial part of the downstroke of the piston. In the Packard engine, designed for high-speed operation, the injection starts at 45

degrees before top dead center and continues approximately until the upper limit of the piston movement is obtained. At or immediately after this point, the maximum pressure of about 1,200 lb. per sq.in. at wide open throttle is reached.

During the downward movement of the piston the heated gas expands, and the pressure gradually falls until with the piston about 45 degrees short of bottom dead center the valve is reopened. The exhaust begins at that point and continues through the upward stroke.

The cycle of operations is then complete. The single valve thus opens and closes only once in each cycle, remaining open for a total of approximately 440 out of the 720 degrees of crankshaft travel.

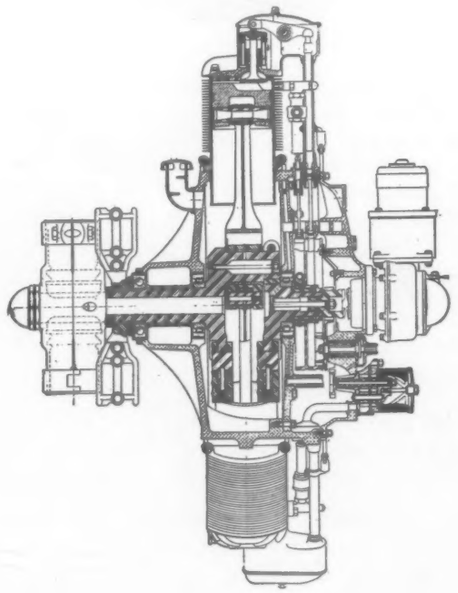
So far as the pilot of the airplane is concerned, the operation of the engine is in no particular dissimilar from that of a gasoline engine. It looks much the same to the casual glance. It is controlled through a single throttle in the same way, and responds as positively. The sound is very much the same. While the odor of the exhaust is distinctly different and may be noticed in an open cockpit ship, the difference is not so conspicuous as to force itself upon the pilot's attention. As will be indicated later, the operations of starting are essentially similar except for the absence of a switch. Since the engine is similar to the gasoline type in weight, power, and dimensions, it goes without saying that no differences are apparent in the essential qualities of the airplane. A light open-cockpit machine with the engine installed loops, rolls, and spins with customary facility.

Fuel System and Combustion

As already indicated, the fuel is projected into the cylinders by nine separate pumps, one for each cylinder. One of the first problems in design of a fuel system and combustion chamber for a high-speed Diesel engine is the proper mixing of the fuel and the air. For a number of years the National Advisory Committee for Aeronautics has been conducting exhaustive researches on spray penetration in combustion chambers, studying various forms of nozzle and the effect of varying the spraying pressures and the swiftness with which the pressures are applied. It had been the general experience that the maximum penetration that can be obtained with a spray of very short duration is startlingly small, at least in comparison with the cylinder dimensions. Half an inch is a good penetration. In the case of the Packard engine the time available for putting the fuel into the cylinder is about 0.004 sec. Under these circumstances the designers have adopted an expedient which is also being used in modified form on several recent European Diesels for high-speed service. Instead of trying to spray the fuel across the air supply, they seek artificially to create a turbulence which will sweep the air past the nozzle, taking up the incoming fuel as it goes. The desired turbulence and the continuing tangential motion of the air around the combustion chamber is secured, as will be seen in the sectioned rear view of the engine (reproduced herewith) by giving the inlet port the form of a flattened Venturi directed tangentially around the cylinder bore. The photographs of the cylinders also give some indication of the layout. The air enters at high speed, and traveling around the cylinder in a counter-clockwise direction as seen from the head end the motion persists long enough, judging from operating experience with the engine, so that practically all of the oxygen comes in contact with the fuel spray despite the very limited direct penetration.

Working back from the cylinder to the fuel pump, a characteristic feature of the Packard design is found in the use of nine separate plunger pumps, one for each cylinder, and placed as close as is mechanically expedient to the combustion chamber for which they furnish the fuel. The arrangement has the dual advantage of reducing the likelihood of failure in the piping system from the pump and of eliminating the effects either of stretching of the tubing under the enormous pressure which the pump generates or of compressing the fuel itself and injecting it into the cylinder in a series of surges, corresponding to successive pressure waves. Air locks also make trouble in long pipes.

The fuel pumps and spray nozzle are almost a single unit. The spray pressures run to a maximum of 6,000 lb. per sq.in. The pump is of a simple plunger type,



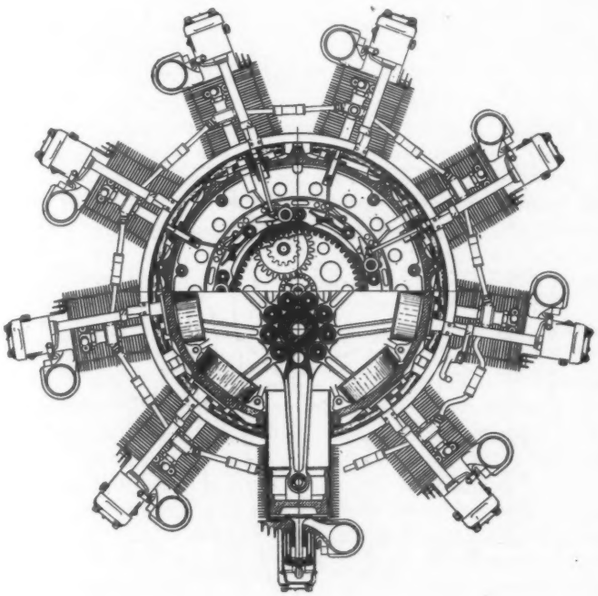
and will later be described in mechanical detail. The spray nozzle is of a flare form, containing a small poppett valve. The spray is thus conical. To make it unnecessary to force the valve off of its seat against its spring before the injection of fuel can start, there is a separate stop screw bearing against the end of the valve stem and holding it a few thousandths of an inch off the seat at all times. This slight cracking of the valve is particularly important for easy starting, as well as for the expulsion of any entrapped air. To prevent any backing up of gases from the combustion chamber into the fuel pump a small check valve is inserted in the barrel between the pump and the nozzle.

Turning back to the suction side of the pump, via a line extending all around the engine, as shown in several of the photographs and in the rear elevation drawing, a fuel pump of ordinary form draws the fuel from the tank and keeps it circulating through the entire system. The fuel passes from the line into the pump cylinder through ports opened by the movement of the pistons. A screen protects the entry to the pump.

Although purely mechanical features will be left for later description, the method of actuation and control of the fuel pump should be examined in connection with the explanation of the general functioning of the fuel

system. It is shown with admirable clarity both in the sectioned rear elevation and in the photograph of the engine with the rear cover plate of the crankcase removed, exposing the accessories. There is a cam ring, in no essential particular dissimilar from that used on radial gasoline engines. It operates on tappets, which in turn actuate the pump plungers through short oblique rods restrained near their lower end by pivoted links.

It is upon the detail of this linkage that the control of engine power depends. The lower end of the fuel-pump operating tappet sits in a specially formed channel provided in the pivoted rocker that bears directly against the cam. The pivoted link just mentioned is attached at one end to the tappet and at the other to a circular control ring concentric with the crankshaft (well shown in the drawing and in the photograph), the rotation of



which ring about the center of the engine is controlled by the "throttle" lever. Rotating the ring changes the obliquity of the tappets to the pump plungers, and also changes the distance from the pivot to the rocker arm to the point at which the tappet makes contact with its surface in the grooved channel provided. As the point of contact is moved farther away from the pivot of the rocker arm, the lineal travel imparted to the tappet, and therefore the stroke of the pump, increase. The control of engine output is entirely through this variation of fuel-pump stroke. The engine is stopped by throttling back (past a spring stop which limits the ordinary travel movement) to such a point that the pump plunger moves no higher than the inlet port in the pump cylinder and consequently delivers no fuel to the spray nozzle.

To help the engine to run more steadily at low speed a special idling control is provided. It will be noticed in the photograph that the intake and the exhaust ports communicating with the single valve are in the form of a straight tube fixed to each cylinder head, open at its forward end to the atmosphere and at its after end to the exhaust manifold. The normal flow of air when in flight forces the intake air in at the forward end and the major part of the exhaust out at the rear. For idling, however, a shutter valve is mounted on each cylinder head to close off the open end of the air tube. These shutters are operated by means of a cam connected with the throttle, so that when the throttle is nearly closed the intake air is being drawn back through the exhaust manifold. With this control in operation it is possible to run the engine steadily at speeds as low as 250 r.p.m.

Fuel Requirements

THE ENGINE has been tried, and has operated with a reasonable measure of success, on many different kinds of fuel. The essential requirements include, however, not merely the ability to run but also: commercial availability; cleanliness as commercially delivered, to avoid abrasion of the fuel pumps or clogging of nozzles; a low enough pour point and viscosity to insure free flow from the tanks through pipes of reasonable dimensions, especially at the low temperatures of winter or high altitude; a good degree of "oiliness" to reduce the problems of lubrication of the fuel pumps, sufficient ease of production from crude petroleum, and availability in a large enough ratio to the total supply of crude, to insure a reasonably low price, even if the demand becomes very high.

The conditions have been met most nearly to the satisfaction of the Packard Company by domestic furnace oil, which has a gravity of approximately 37 deg. Baumé, and that fuel has been used in most of the test flying. The engine will operate on gasoline, but not satisfactorily, as the lack of "oiliness" would cause rapid wear in the moving parts of the fuel system.

Starting

THE STARTING is essentially similar to that of a gasoline engine. An inertia starter is used, and the only differences in technique are that there is no switch and no preliminary priming or choking, the throttle being held wide open when the starter is thrown into action. When starting at low temperatures some pre-heating is necessary, and is provided by an electrically heated glow plug in each cylinder. These plugs are permanently connected into the starter motor circuit so that they are heated whenever the starting motor is being energized, no independent action on the part of the pilot being necessary. They are only needed when starting, and are entirely inoperative at other times. Although the glow plugs are only required at low temperatures, in the interest of simplicity they are left permanently connected up, and are used regardless of engine temperature.

In the early work several other types of starters were used, especially an explosion type using a blank shotgun shell as the actuating means, but they were subsequently abandoned in favor of the inertia type.

High Altitude Operation

SCEPTICS upon the aircraft Diesel have frequently forecast that the engine would be unable to operate at high altitudes, as insufficient heat of compression would be developed. It is known that in some cases there has been serious difficulty in operating industrial Diesels in South American mines and at other points far above sea-level, but the temperature developed in compression should theoretically depend only on the compression ratio, not at all on the initial pressure of the air, and in practice the Packard company appears to have experienced no difficulty with its own engine. Both of the two planes in which it has been installed have been flown to over 18,000 ft. above sea level without any special accessories on the engine and without any failure of its functioning.

One of the peculiarities of the Diesel is an increase in r.p.m. for a given throttle setting (other than full throttle) with increasing altitude, as opposed to the usual drop of speed in the gasoline type. The amount of fuel injected into the cylinder is quite independent of altitude, being metered by the fuel pump under control of the throttle, and if the engine be throttled back to develop half of its full power at sea level, the amount of fuel injected is sufficient to combine with all the available oxygen, thus giving the equivalent of full throttle operation at that altitude. Conversely, it is of course undesirable to keep the throttle wide open at high altitudes, as an excess of fuel beyond the combining capacity of the indrawn oxygen would then be injected. Obviously, there is no need and no opportunity for a separate mixture control on the Diesel.

Reserve Power

ONE PECULIAR FEATURE of the Diesel is the possibility of "overloading," securing a considerable increase in torque and power output beyond the rated power at the sacrifice of fuel economy. For taking off and climbing the engine power can be temporarily increased by about ten per cent at the expense of a twenty per cent increase in specific fuel consumption. The explanation lies in the necessity of providing a certain amount of excess air to insure complete combustion of the fuel injected. The normal rating of the engine is based on a 25 per cent excess. If the throttle be advanced another notch and the amount of fuel that flows into the cylinder be increased to the full theoretical amount with which the oxygen content of the cylinder could combine chemically, combination will actually be incomplete and economy correspondingly poor, but as already indicated the power would be stepped up. The incomplete combustion under these conditions is shown by a trail of smoke.

Lubrication

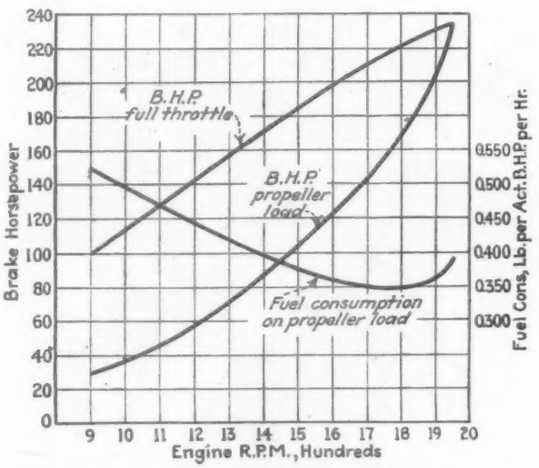
THE LUBRICATION SYSTEM is in a general way similar to that of a gasoline engine. As in other radials a dry-sump system is used, the oil being pumped from the tank and led to the engine through a special hollow rocker arm pin opposite No. 4 cylinder. At the inboard end of this pin a groove is arranged in the crankcase diaphragm and a radial hole is drilled leading the oil to a socket connection which receives one end of what appears to be a hollow dumb-bell. The other end of this swinging connection engages a socket in a forged ring floating on the hub of the cam. The oil is led through a groove in this ring to several holes in the cam and thence through drilled passages to the hollow extension of the rear crankshaft half. It might be mentioned in passing that the purpose of the dumb-bell connection referred to is to allow the oil ring to float concentrically on the cam without being restrained in any direction by the connecting member.

The rear crankshaft is drilled in line with a hole in the crankpin communicating with the interior thereof which is bored out for lightness and to act as an oil reservoir. A hole is drilled in the crankpin for lubricating the connecting rod bearing which is formed of two flanged bushings mounted end to end with a small space between them. Oil flows through this space into slots machined in the master connecting rod big end bore and thence through small holes drilled at an angle to bring oil under pressure to the link rod pin bushings.

Returning to the crankcase diaphragm oil passages, the main radial feed hole which supplies oil to the oil ring referred to is extended to meet a groove surrounding the rear roller bearing liner. This circular groove distributes oil through eight other radially drilled passages to each of the hollow rocker arm shafts. These shafts in turn are drilled radially with small holes to provide pressure lubrication for both the fuel and valve rocker arms. The valve rocker arm is further provided with a small drilled passage in one of the webs leading oil to the rocker arm roller pin and this pin is drilled with several radial holes to lubricate the roller bushing. The crankcase cover is also drilled with various passages so that positive lubrication is supplied to the various accessory shafts and their bearings.

On the return circuit the oil thrown from the various bearings gathers in the bottom of the crankcase, a slot being provided at the bottom of the diaphragm to permit the oil from the front compartment of the crankcase to flow to the rear compartment.

The scavenging oil pump is mounted in a unit with the pressure pump and return line of the scavenging pump consists merely of a gooseneck shaped tube flanged to



Performance of the Packard-Diesel 9-cylinder radial aircraft engine (Power data corrected to sea-level and 60° Fahr. temp.)

the inside of the crankcase cover and attached to a coarse screened funnel arranged to suck the oil from the floor of the rear crankcase compartment.

The scavenging pump then discharges the oil back to the oil tank in the regular way. It will thus be seen that all bearings within the engine are positively lubricated except that the anti-friction bearings, piston pin bushings and cylinder walls are lubricated by splash or spray in the customary fashion.

The external valve rocker arm bearings are of the roller bearing type and are lubricated periodically by means of a pressure gun, such lubrication being required every 25 or 50 hours of engine operation.

The relief valve in the oil feed line is set to bypass the oil at 60 lb. pressure.

Mechanical Detail

IN ORDER to keep the weight of the Diesel low enough to make it competitive with the gasoline engine the utmost refinement in mechanical design is necessary. Captain Woolson observes that it is easier to design a Diesel on theoretical principles than any other type of

engine, since there is no abnormal condition, such as detonation introduces into the gasoline power-plant, to allow for. Maximum operating pressures can be accurately forecast, and the design based on the anticipated normal conditions with some assurance that they will not be exceeded.

PERHAPS the most striking mechanical feature of the design, well shown in the quartering front photograph, is the use of a one-piece crankcase, with provision for distributing the tension load on the cylinder bases due to explosion pressures over a large part of the periphery of the crankcase before transmitting them through to the main bearings. In place of cylinder studs, which necessarily impart a localized load to the crankcase, two clamping bands running around the crankcase and over the bases of all the cylinders are used. These hoops are tightened up by turnbuckles so that an initial tensile stress is set up which exceeds any operating stresses resulting from the cylinder explosions. The crankcase is thus subjected to an initial compression, and the light alloy is never allowed to sustain tension which it is ill adapted to resist. The crankcase weighs but 34 lb.

The explosion pressures in the Diesel being very high, precautionary steps have had to be taken to protect the major structural parts against impact loading. That has been accomplished primarily by a flexible mounting of the crankshaft counterweights and the propeller, so that when the peak pressure exists there is a certain amount of cushioning between the crankshaft and the parts that have the maximum rotational inertia. Stresses in the crankshaft can thus be greatly reduced.

To be specific, the crankshaft counterweights, instead of being rigidly bolted to the crankshaft or forged integrally with it, are hung on a pivot and centered between powerful springs. When the crankshaft is suddenly accelerated, the counterweights lag behind slightly to reduce the effective inertia. Similarly the propeller hub, instead of being splined or keyed to the crankshaft, is allowed to float on an extension of the crankshaft driving end. The propeller blade clampings carry driving lugs which receive the driving effort from a two-armed driving member splined to the crankshaft (well shown in one of the photographs of the engine installed in an airplane). At the end of each of these arms the corresponding propeller clamp ring-driving lug is held between two compressed rubber blocks, permitting of a small amount of yielding. The propeller hub is thus cushioned from driving shocks and can be made exceedingly light.

Anyone with experience of torsional vibration will immediately be suspicious of thus allowing torsional freedom, as likely to aggravate vibration troubles. Those appear to be overcome by the inherent hysteresis and damping of the rubber blocks, together with the mechanical friction between the parts pivoted together.

The cylinders weigh only 11¾ lb. The heat losses through the cylinder walls being lower in a Diesel type than in a gasoline engine, it was felt to be unnecessary to use a separate cylinder head of aluminum alloy for better heat conduction. A closed-end steel cylinder is therefore employed, with an aluminum alloy cover, cast and with cooling fins, held over the top by studs. The primary function of the cover is to furnish a mounting base for the valve gear. The valves are operated by a conventional push-rod and rocker-arm gear from a cam ring integral with that driving the fuel pumps. In accordance with past Packard practice on gasoline engines, a multiplicity of springs are used (as shown in one of the photographs). The actual number on each valve is twelve, the object being both to prevent the liability of loss of a cylinder due to the breakage of a single valve spring and to reduce the possibility of surging in the springs making the valve operation irregular.

Pistons and connecting rods follow standard practice, the master rod assembly being of the conventional type. The pistons are of aluminum alloy. The peculiar form is shown in one of the photographs, the eccentrically placed pocket helping to provide the swirling turbulence necessary to high-speed operation. Each piston carries two compression rings and one scraper ring low on the skirt. The crankshaft is also normal, being of the split type with the front and rear halves bound together by a clamping bolt. The main crankshaft bearings are both roller bearings, the front one being mounted in the crankcase itself and the rear one in a removable plate or diaphragm fitted into the crankcase in line with the rear cylinder-clamping band. The diaphragm itself is located in place by studs, and carries most of the working parts pertaining to the fuel system as well as the rear main bearings.

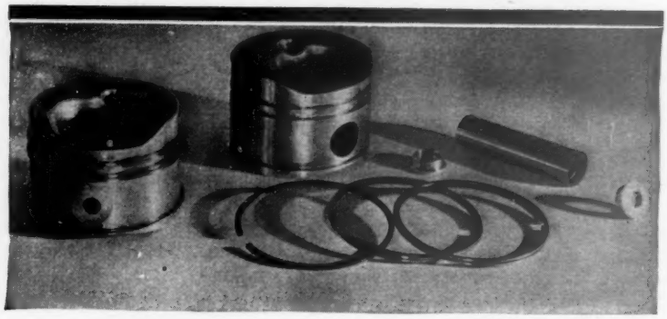
The crankcase, as previously noted in connection with the mention of the method of cylinder attachment, is a one-piece casting of magnesium alloy. The casting includes both the annular portions of the crankcase and the front end.

Most of the accessories are housed inside the rear end of the crankcase either between the diaphragm just alluded to and the cover plate or on the outside of the cover plate itself. None of the accessories offer any special mechanical problem as to their design or installation except the fuel pumps, which have to operate in so short a time interval in each revolution that the acceleration and dynamic load becomes enormous. Some of the parts operate at accelerations as high as 15,000 ft. per sec. per sec. or nearly 500 times gravity.

The pump is made of alloy steel forgings. The plunger is of heat-treated steel. The actuating tappets serve only to thrust the plunger upward in its cylinder, the return being effected by a compression spring surrounding the cylinder.

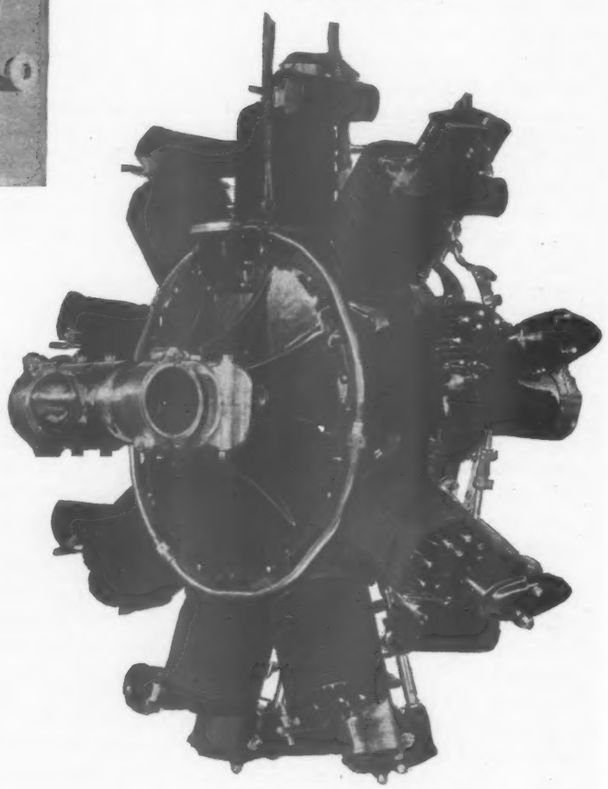
THE ENGINE as here described comes to the Show with several thousand hours of dynamometer operation and some thousands of miles in cross-country flying in two planes, a Stinson monoplane and a taper-wing Waco, behind it. A single engine has been run for 500 hr. on the dynamometer without overhaul. Flight experience has included a great variety of tests under miscellaneous conditions, including the use of radio on the plane to furnish direct verification of the obvious fact that there can be no radio interference where there is no electrical apparatus. Temperatures as low as 17 deg. below zero Fahrenheit have been encountered. The general performance of the plane has been found practically identical with that of the same machine equipped with a gasoline engine, as might have been anticipated, since neither weight, power, nor frontal area were appreciably changed. The fuel consumption, however, was reduced, being between nine and ten gallons per hour when cruising. The fuel consumption of the Diesel under cruising conditions has proven exceptionally satisfactory because the Diesel under throttled conditions automatically yields its maximum efficiency, while with the gasoline engine the best possible consumption for any given throttle setting is only to be obtained by a more careful regulation of the mixture control than the average pilot is likely to give.

DESIGN DETAILS OF THE *Packard-Diesel*

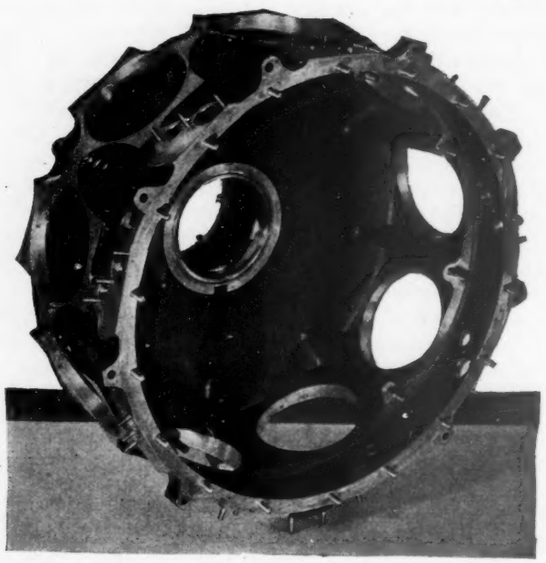


Pistons, rings, and piston pins conform to common practice except for the shape of the piston head

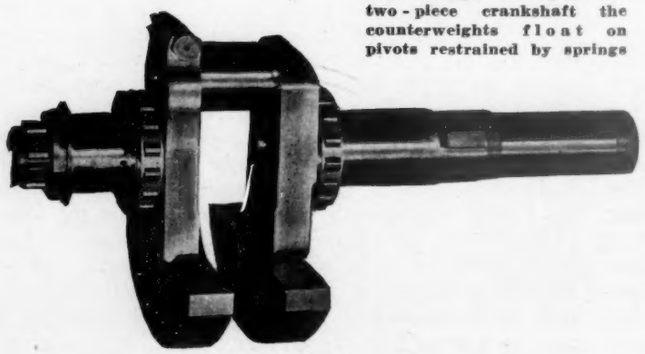
Quarterly front view, exhaust manifold removed. Ready for the installation of exhaust manifold and propeller blades

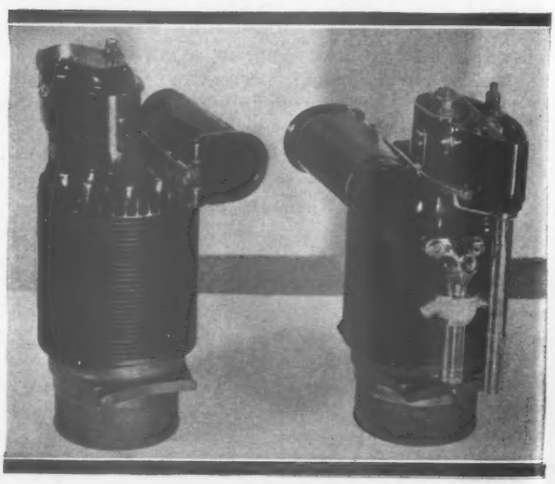


The one-piece crankcase is a magnesium casting



Crankshaft, showing particularly the joining of its two parts and the pivoting of the counterweights. Upon the two-piece crankshaft the counterweights float on pivots restrained by springs

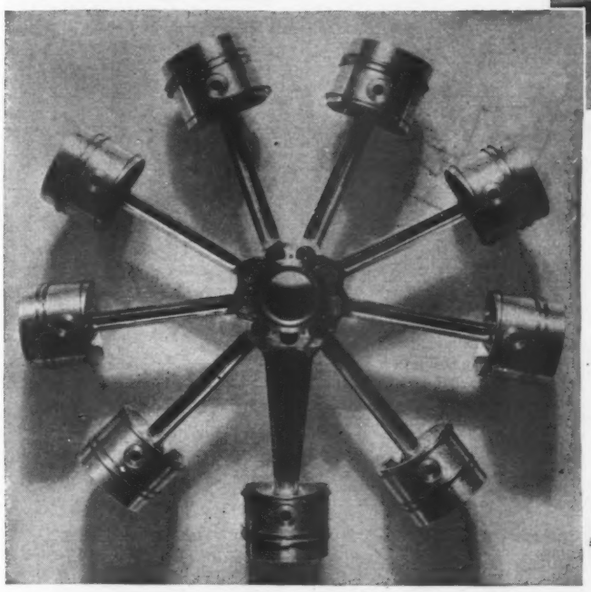


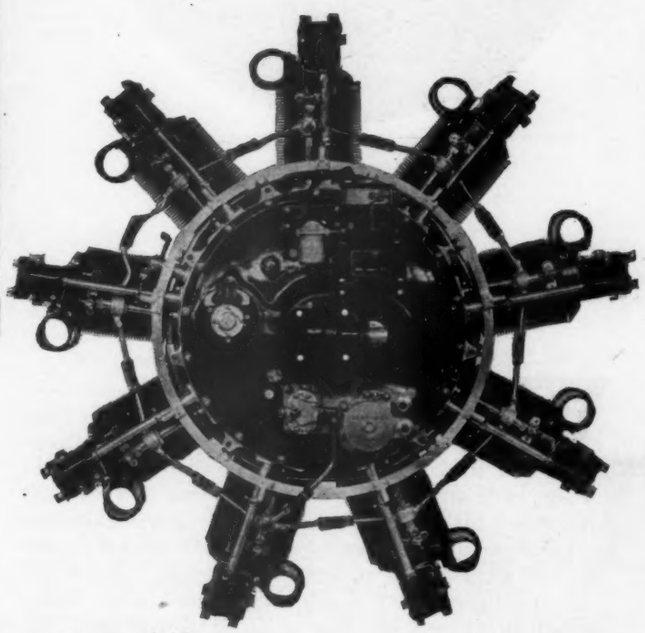


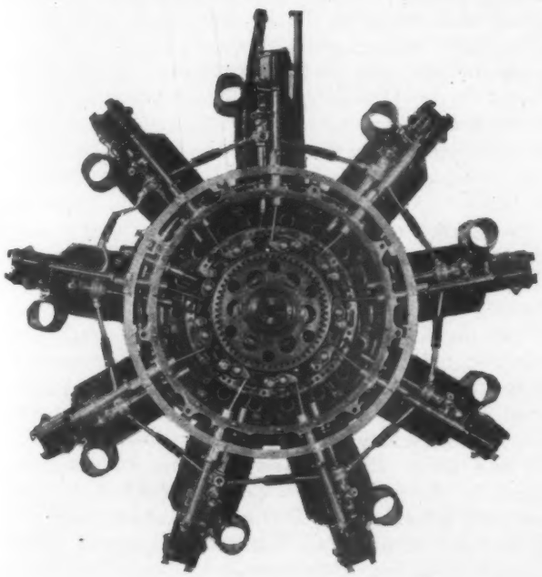
Front and rear view. The cylinder takes in its air tangentially at one side. The fuel pump unit is bolted in place

AIRCRAFT ENGINE

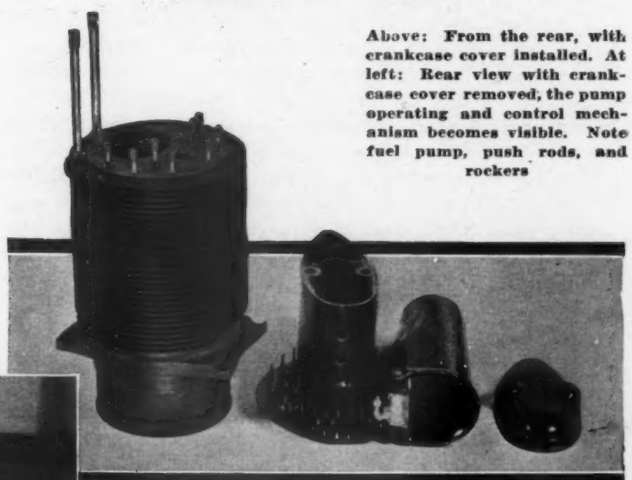
Each valve has twelve springs carried on a spider frame



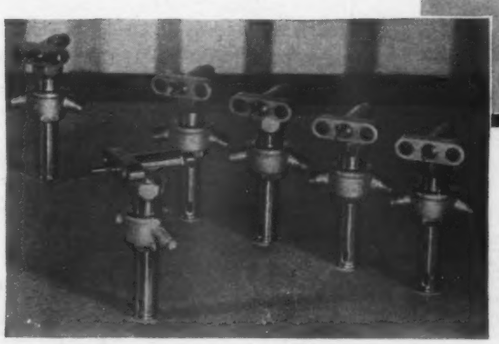




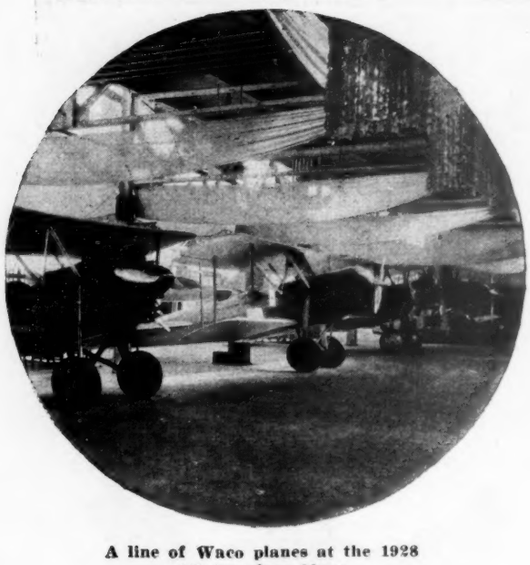
Above: From the rear, with crankcase cover installed. At left: Rear view with crankcase cover removed, the pump operating and control mechanism becomes visible. Note fuel pump, push rods, and rockers



Cylinder and head and valve cover. The steel cylinder has a closed end with a cover plate to carry the intake tube and valve gear



Fuel pump and spray nozzle, one for each cylinder, are made up as a unit



A line of Waco planes at the 1928 All-American Show

THE THIRD *All-American*

Some Interesting High Lights on Detroit During A

By JOHN T. NEVILL
Detroit Editor of AVIATION

WHEN THESE LINES are published the third annual All-American Aircraft Show will have opened in Detroit. There seems little doubt but that the industry will attend the show with a new and stronger hold upon itself. That is to say that it will probably have head and shoulders, at least, out of the financial depression that settled upon all business some six months ago.

Meanwhile, it would seem that the industry has looked forward to the Detroit show as an ideal place and time to compare notes on certain all-important experiments that have come to a head most recently, these experiments being both economic and technical. Many months ago the feeling in the industry was mutual that the airplane had been sufficiently advanced, technically, to warrant more or less general acceptance by the public. This was followed by a period of excessive and decidedly unwise production, or rather over-production, which was made more costly, and in some cases, calamitous, by the stock crash of last Fall. More recently the industry has come to realize that it had taken the "idea selling" flights of 1927, '28 and '29 entirely too literally; that the selling of aviation as a worth-while utility was yet to be done. Therefore, the merchandising of aircraft and aircraft usage has become the major thought of the hour.

Pioneered by air transport operators the industry about five months ago began experimenting with price reduction as a means of attracting public patronage. So far, speaking generally, the experiment has shown the operators that high fares have kept approximately 50 per cent of their seats empty; also that larger passenger planes are needed. Price reduction in the manufacturing field is still too new an experiment to know much about what the results will be. Those who started it are confident of its benefits.

The foregoing thoughts have been emphasized here at the start solely because they constitute the theme underlying the third annual All-American Aircraft Show. Reduced prices in small aircraft, increased passenger carrying capacity in the larger types, and Diesel type engines will comprise the keynote of the show.

The third annual All-American Aircraft Show, as during the past two years, is sponsored by the Aircraft Bureau of the Detroit Board of Commerce, sanctioned by the Aeronautical Chamber of Commerce of America and managed by Ray Cooper, of the Detroit Board. The same group of automobile financiers and bankers is on the Show's executive committee, and the industry can safely assume that the dynamic quality that has characterized Detroit's two preceding shows will maintain.

Aside from the usual number of new planes and new models of established planes two outstanding features will set the show apart from anything of its kind ever attempted heretofore. Probably the most important of these is the first public showing of the long awaited Diesel. Second, the exhibition will be held on an airport, approximately five miles from downtown Detroit, and will cover 193,000 sq.ft. of the largest airplane hangar in the world, an imposing $1,000,000 structure containing a total of 205,000 sq.ft. of floor space. (The Detroit City Airport and Municipal Hangar is described in another article in this issue.)

Elaborating a bit on these features we return again to Diesel engines. The Packard Motor Car Company, builder of the only Diesel type airplane engine in this country that might be regarded as proven, will display its 225-hp. Diesel in the All-American Show. (This engine, which has been under development by Capt. L. M. Woolson, of the Packard Company, for several years, is described in detail elsewhere in this issue.) Further than that it is virtually certain that the Packard Company will have its two Diesel powered planes—a Stinson-Detroiter and a Waco—on the field in order to demonstrate them in flight.

The Stinson Aircraft Corporation, now a subsidiary of the Cord Corporation, which concern surprised manu-

ANNUAL *Aircraft Show*

on Exhibits and Activities in Air Show Week

A section of the Curtiss display at the 1929 Detroit Show

facturers at St. Louis with its well known mass production-low price announcement, will exhibit a Stinson Junior equipped with the Packard-Diesel. Rumor has it, in fact, that there will at least be half a dozen planes in the show powered with Diesels. Although, at this writing, no definite announcement has been made, planes likely to be so equipped will include, besides the Stinson, the Ryan, the Waco and the Verville. A report that Ford would display one of his tri-engined, all-metal monoplanes with Diesel powerplants, remains unconfirmed as this is written.

THE DETROIT SHOW, according to the latest figures, will contain a total of 82 airplanes and four gliders, entered by 44 manufacturers when counting subsidiary companies as units. There will be 115 accessory booths, numbering among them approximately 15 engine manufacturers. Judging by the exhibits entered a more representative aggregation could scarcely be brought together.

That the Detroit show will be held under one roof, upon one floor, and within a few feet of demonstrating planes on the field is an inestimable asset to the industry as well as to the show's backers. The tedious and expensive process of towing a plane, *sans* wings, through automobile laden streets has been eliminated, yet Detroit City Airport is but little farther from downtown Detroit than is Convention Hall, where the All-American Show has been held previously. Nor is disassembling on the airport necessary—even for the Fokker F-32, which will be the largest plane in the building. Most of the exhibited planes, in fact, will have been flown to the airport, taxied to the hangar's monstrous apron, drained of fuel, and rolled in to its exhibiting area. Others, of course, will have been shipped in, in crated form, some of them, it is understood, directly from St. Louis, where they were last exhibited.

Each of the exhibiting areas, by the way, have been given numbers along "avenues" or passageways of varying width, appropriately called "airways" and bearing such names as Lindbergh, Richard Byrd, Mason Patrick, MacCracken, etc. The huge structure's interior will be decorated brightly in blue and gold, more than 55,000 yards of bunting being required for this work.

Although the Detroit Committee has designed the All-American Show as an advertising and sales medium for the industry it is determined to bar the exhibitor whose sales or solicitation methods are not in keeping with the dignity of the industry or character of the show. The "good faith" check of one would-be exhibitor was returned because of so-called "lapel grabbing" tactics practiced by this exhibitor at the St. Louis show. While speaking of the rules it is worth mentioning that children under 16 years of age will not be admitted unless accompanied by parents or guardians. The advisability of admitting small boys to aircraft shows is still a moot question in the industry. If accompanied by an adult escort children under 16 will be admitted for 25 cents, the price of admission for adults being 75 cents. As in past years exhibitors of airplanes are not being charged for space, although a charge of 50 cents per sq.ft. has been levied against accessory exhibitors.

With the idea of allowing the exhibitors as much time as possible to make contacts and sell airplanes, the week of the show, April 5-12, has been kept practically free from meetings, the only gatherings of this kind being those of the S.A.E., the Women's N.A.A. and two meetings participated in by factory purchasing agents. The first of these last named meetings, according to plans, will be between the buyers and men from whom they purchase materials, the second being for the buyers, themselves. It is hoped, as a result of these conferences, to effect closer, more efficient co-operation between the two groups and to leave them with a better understanding of one another's problems.

The week, as is usual, has been divided into designated "days," Saturday, April 5, being opening or Dedication Day. Formal opening of the doors has been set for 3 p.m., instead of the usual 7 p.m. This will be preceded earlier by a formal dedication ceremony participated in by prominent aircraft and Detroit municipal officials. Sunday will be Famous Pilots Day, Monday,

Ladies' Day, Tuesday, International Day, Wednesday, Engineers' and Gliders' Day, Thursday, Diplomats' Day, Friday, Governor's Day, and Saturday, Family Day. A gliding demonstration on the airport Wednesday afternoon will follow a discussion of that science by members of the S.A.E. at the Book-Cadillac Hotel. The rapidly increasing interest in motorless flight should make the afternoon's program decidedly interesting.

Sessions of the S.A.E. will cover three days, Tuesday, Wednesday and Thursday, all of them being held at the Book-Cadillac Hotel. Among the speakers before the various sessions will be Capt. L. M. Woolson, Packard Motor Car Company; E. P. Lott and Wesley L. Smith, National Air Transport; T. P. Wright, Curtiss Aeroplane and Motor Co.; and Edward P. Warner, editor of AVIATION, and president of the Society.

Tuesday, International Day, has been set apart in honor of the Mexican, Canadian and other foreign aircraft leaders who will be in attendance at the show. At least two big dinners will be staged in downtown hotels during the week, these being the S.A.E. dinner, to be held Tuesday evening at the Book-Cadillac, and the Aviation dinner, scheduled for Thursday evening at the Statler. Heretofore, these two banquets have been held jointly in Detroit.

AS STATED PREVIOUSLY, the municipal airport is located well within the city limits and about 20 minutes from any downtown hotel. The Detroit Police Department and the Detroit Automobile Club are co-operating with Manager Cooper in working out suitable traffic routes to and from the airport. Although a Gratiot Avenue street car will take one directly to the door of the exposition building, both the Detroit Street Railways and the Detroit Motor Bus Company will operate special bus service during the week. An almost unlimited automobile parking area is provided just outside the airport fence along Connoss Avenue.

A "safe and sane" set of air traffic rules to be in effect on the airport during the week has been worked out by William J. Wallace, engineer-manager of the port, and R. D. Bedinger, Dept. of Commerce inspector, Detroit district. These rules (contained in the airport article in this issue) will be strictly enforced by a special squad of "aero-educated" police officers working under direction of Mr. Bedinger and several additional Commerce Department inspectors. Printed pamphlets containing the rules, a map of the airport and other information relative to Detroit flying fields have been mailed by city officials to all exhibitors.

Manager Cooper this year is departing from the past custom of "stirring up local interest" in the show by means of numerous aviation luncheon meetings held by local civic organizations and addressed by prominent members of the industry who are attending the show. The wisdom of this departure is doubted in some quarters, it being pointed out that gate receipts will suffer, and that splendid opportunities to put over the "gospel of aviation" are being overlooked. However, that remains to be seen. Mr. Cooper, meanwhile, is laying his bet on the interest-catching aspects of the show, itself, concentrating his bid for gate receipts in a carefully planned publicity and advertising campaign focused, to a major degree, on local newspapers. As it was last year, the matter of publicity has been placed in the hands of Henry O. Weitschat, veteran Detroit newspaperman.

From information available at this writing it would seem that 74 of the ships exhibited will be of the land variety, while eight will be of the flying boat or amphibion type. Due to the easiness with which any land plane may be converted into a seaplane, seaplanes have not been included in the latter figure. Because of the increasing popularity of over-water craft it is likely that a half dozen or more exhibitors will display water landing gear either installed on or alongside their craft. Speaking of water type aircraft coming into favor the Detroit Flying Club probably will seize upon the show as an ideal time to announce plans for an 2,500 mile over-water tour around the Great Lakes—a tour projected for next summer.

Just how many new planes will be displayed cannot be told as this is written. However, among them will be the new Sikorsky, 5 place, amphibion, the all-metal Towle amphibion, a craft employing a very unusual method of internal wing trussing; the new Spartan 4 place cabin monoplane, the 4 place bi-engined Issodun amphibion, the Crosley "Moonbeam," a 2 place open biplane; and the 6 place, tri-engined Ogden "Osprey" cabin monoplane. It is also likely that Consolidated will exhibit the all-metal "Fleetster" monoplane, and that Detroit Aircraft will show the new all-metal Lockheed. The Detroit firm is converting the Eastman flying boat into an amphibion. Whether or not the Eastman amphibion will be ready for the show is not now known.

From the point of view of number of planes the 1930 Detroit show will be smaller than it was last year, when 100 different planes were shown. This, no doubt, is due to the many mergers that began in the industry more than a year ago, and, to some extent, to the ever increasing number of aircraft shows the industry is constantly being asked to patronize. It is to be noted, though, that the 1930 show exceeds by more than a dozen ships the number of planes exhibited in the first All-American show in 1927.

PRACTICALLY all members of the Show's Executive Committee are widely known in the industry, officials of the Committee being Edward S. Evans, chairman; William B. Mayo, Frank W. Blair and William E. Metzger, vice-chairmen; Harvey J. Campbell, secretary; and Mr. Cooper, manager. Other members are Capt. L. M. Woolson, Harry R. Graham, William Robert Wilson, Harold H. Emmons, Charles T. Bush, Norman B. Conger, Griffith Ogden Ellis, Eugene W. Lewis, Sidney D. Waldon, Phelps Newberry, D. Dwight Douglas, W. Magruder Jones, Thomas S. Merrill, and G. Hall Roosevelt. With few exceptions, these men are mainstays in the city's automobile industry—men who have carried the city's fame to all corners of the world. It, therefore, is not surprising to be told that they are the financial and engineering giants who have placed a very helpful shoulder to aeronautics in and about the "Motor City." Even as we write this, word comes to our desk that eight of the largest automobile manufacturers in the country have extended invitations to 30,000 automobile dealers and distributors asking that they attend the city's third annual All-American Aircraft Show.

Since the first All-American Show in 1927 the aircraft industry has regarded the Detroit exposition as one of the most, if not the most, important indoor airplane show of the year. So long as the present enthusiastic yet level-headed local support maintains, it is likely to be regarded so for some time to come.

General Schedule of Events

1930 ALL-AMERICAN AIRCRAFT SHOW AT DETROIT

Friday, April 4

10 a.m.—National Standard Parts Assn., Book-Tower.

Saturday, April 5

Opening of Exposition.

1:30 p.m.—Prominent fliers and city officials leave City Hall for Ford airport. From there they will fly to Detroit Municipal Airport.

3:00 p.m.—Formal dedication of new hangar and opening of show.

Sunday, April 6

Pilot's Day; special events for fliers.

Wednesday, April 9

Engineer's and Glider Day.

10 a.m.—Society of Automotive Engineers, Aircraft Session, C. J. McCarthy, Chairman. Paper, "What is Lightness Worth in an Airplane," by Edward P. Warner, editor of AVIATION. Paper, "Construction Details of the Curtiss Tanager," by T. P. Wright, Curtiss Aeroplane and Motor Co.; Crystal Room, Book-Cadillac Hotel.

2:00 p.m.—Society of Automotive Engineers, Glider Session, Paper, "Principles of Glider Design," by Wm. Perfield, Stout Engineering Laboratories; Crystal Room, Book-Cadillac Hotel.

3:15 p.m.—Glider demonstration, auspices National Glider Assn. Detroit Municipal Airport. Buses leave Book-Cadillac Hotel at 3:00 p.m.

8:00 p.m.—Aircraft Assn. of Mich., meeting. Place unnamed.

Thursday, April 10

Diplomat's Day; delegation of diplomats from Washington to attend.

10:00 a.m.—Society of Automotive Engineers, Inspection trip to Ford airport, factory, museum and antique village. Buses will leave from the Book-Cadillac Hotel.

6:30 p.m.—Detroit Board of Commerce, Aviation Dinner. Clarice Adams, Detroit, Toastmaster. Statler Hotel.

Friday, April 11

Governor's Day, in honor of Governor F. W. Green of Michigan.

Saturday, April 12

Family Day; special features for children.

6:30 p.m.—National Glider Assn., Dinner in honor of W. H. Bowlus, American Glider champion, Statler Hotel.

10:30 p.m.—Exposition is ended.

LIST OF *Exhibitors*

Airplane Exhibits

Aeronautical Corporation of America, Lunken Airport, Cincinnati, Ohio; representative, A. J. Edwards; "Aeronca," C-2, single place, high wing monoplane; show address, 132-136 Lindbergh Airway.

Alexander Aircraft Company, Colorado Springs, Colo.; representative, Willis E. Kysor Eaglerock Company, Niles, Michigan; Eaglerock "Bullet," four place, cabin monoplane; three place, open, biplane; show address, 74-90 Lindbergh Airway.

Warrior Aircraft Corporation, Alliance, Ohio; representative, M. Mathewson, Mathewson Airways, Inc., Detroit, Michigan; "Argo" 2 place, open, biplane; show show address, 11-17 Patrick Airway.

American Eagle Aircraft Corporation, Fairfax Airport, Kansas City, Kan.; representative, D. H. Hollowell; 3 planes; show address, 89-105 Orville Wright Airway.

American Aeronautical Sales Corporation, 730 Fifth Ave., New York City; Savioa Marchetti, 3 place, amphibian; show address, 75-81 Orville Wright Airway.

Bellanca Aircraft Corporation, New Castle, Del.; representative, K. N. C. Nordyne; 3 planes; show address, 101-113 Glenn Curtiss Airway.

Buhl Aircraft Company, Marysville, Mich.; representative, Herbert Hughes; Standard Sedan, 6 place, cabin, sesquiplane; Senior Sedan, 8 place, cabin sesquiplane; Sport Sedan, 3 place, cabin sesquiplane; show address, 123-135 Glenn Curtiss Airway.

Consolidated Aircraft Corporation, 2050 Elmwood Ave., Buffalo, N. Y.; representative, R. P. Whitman; two Fleet, 2 place, open biplanes; Consolidated Express, 8 place, cabin monoplane; show address, 54-68 Hoover Airway.

Crosley Aircraft Corporation, Sharonville, Ohio; representative, Russell Wiest, "Moonbeam," 2 place, open biplane; show address, 92-100 Orville Wright Airway.

Curtiss-Robertson Airplane Mfg. Co., Anglum, Missouri; representative, C. V. Burnett, Curtiss-Wright Flying Service of Michigan, Detroit, Mich.; Curtiss Robin, 3 place, cabin monoplane; show address, 25-39 MacCracken Airway.

Davis Aircraft Corporation, Richmond, Ind.; representative, Walter C. Davis; 2 place, open, monoplane; show address, 36-42 Lindbergh Airway.

Driggs Aircraft Corporation, Lansing, Mich.; representative, Ivan H. Driggs, "Skylark," 2 place, open biplane; show address, 37-43 Orville Wright Airway.

Eastman Aircraft Corporation, Division, Detroit Aircraft Corporation, Detroit, Mich.; "Eastman" flying boat; show address, 92-100 Glenn Curtiss Airway.

Fairchild Airplane Manufacturing Corporation, Farmingdale, L. I., N. Y.; representative, A. A. Woodruff; 4 planes; show address, 106-116 Lindbergh Airway.

Fokker Aircraft Corporation, 1775 Broadway, New York City; representatives, H. A. Reed, E. V. Rickenbacker, Roy E. Russell; Super-Universal, 8 place, cabin monoplane; Universal, 5 place, cabin monoplane; Mail plane, F-14, monoplane; Trimotor, F-10A, 14 place, cabin monoplane; F-32, 32 passenger, cabin monoplane; Amphibian, 8 place, cabin monoplane; show address, 144-172 West Aviation Concourse.

Granville Bros. Aircraft, Inc., Springfield, Mass.; 2 place, open biplane.

Great Lakes Aircraft Corporation, 16800 St. Clair Avenue, Cleveland, Ohio; representative, Ben. F. Castle; Great Lakes Trainer, three 2 place, open biplanes; show address, 25-38 MacCracken Airway.

Issoudun Aircraft Corporation, Northville, Mich., "Issoudun" amphibian; show address, 143-151 East Aviation Concourse.

Kari-Keen Aircraft, Inc., 509 Plymouth St., Sioux City, Iowa; representative, F. M. Davy, 214 East Hamilton Street, Flint, Michigan; Kari-Keen Coupe, 2 place cabin monoplane; show address, 132-136 Orville Wright Airway.

Keystone Aircraft Corporation, 31st & East River, New York City; representative, Stanley W. Jacques; Keystone Loening "Commuter," 4 place, cabin biplane; 163-171 West Aviation Concourse.

E. M. Laird Airplane Company, 4500 West 83rd St., Chicago, Ill.; representative, E. M. Laird; "Speedwing," 2 place, open biplane; Laird Whirlwind, 3 place, open biplane; show address, 75-85 Glenn Curtiss Airway.

Lockheed Aircraft Corporation, Division Detroit Aircraft Corporation, Detroit, Mich.; 3 planes; show address, 100-116 Glenn Curtiss Airway.

Metal Aircraft Corporation of Cincinnati, Lunken Airport, Cincinnati, Ohio; "Flamingo," 8 place, cabin monoplane; 170-172 East Aviation Concourse.

Mohawk Aircraft Corporation, 2600 Delaware Street, S. E., Minneapolis, Minn.; representative, A. S. Koch; "Pinto," 2 place, low wing, monoplane; show address, 86-90 Orville Wright Airway.

Mono Aircraft Corporation, Moline, Ill.; representative, D. A. Luscomb; 2 planes; 127-135 Orville Wright Airway.

Moth Aircraft Corporation, St. Louis, Mo., representative, C. V. Burnett, Curtiss-Wright Flying Service of Michigan, Detroit, Michigan; 2 place, open biplane; 59-65 Orville Wright Airway.

Nicholas Beazley Airplane Company, Inc., English & North Sts., Marshall, Mo. representatives, Russell Nicholas and H. A. Speer; Barling NB-3, 3 place, open monoplane; show address, 98-102 Lindbergh Airway.

Ogden Aeronautical Corporation, 1119 Market St., Inglewood, Calif.; representative, Henry H. Ogden; 6 place, tri-motored, cabin monoplane; show address, 144-152 East Aviation Concourse.

Parks Aircraft Corporation, Division Detroit Aircraft Corporation, Detroit, Mich.; 2 planes; show address, 92-100 Glenn Curtiss Airway.

Pitcairn Aircraft, Inc., Bryn Athyn, Penn.; representatives, E. T. Asplundh and G. S. Childs; 1 plane; show address, 154-162 East Aviation Concourse.

Rearwin Airplanes, Incorporated, Fairfax Airport, Kansas City, Kan.; "Ken-Royce," 3 place, open biplane; show address, 45-51 Orville Wright Airway.

Ryan Aircraft Corporation, Division Detroit Aircraft Corporation, Detroit, Mich.; 3 planes; show address, 74-84 Glenn Curtiss Airway.

Sikorsky Aviation Corporation, Bridgeport Airport, Bridgeport, Conn.; representatives, A. C. Dickinson and E. M. Dickinson; Sikorsky Amphibian, 12 place, cabin sesquiplane; 5 place, amphibian; show address, 164-168 East Aviation Concourse.

Simplex Aircraft Corporation, Defiance, Ohio; representative, G. H. Roberts; 2 planes; show address, 74-84 Orville Wright Airway.

Spartan Aircraft Company, Sheridan Rd., Tulsa, Okla.; representatives, J. Baxter Gardner and S. L. Willits; Spartan C-3-165, 3 place, open biplane; Spartan C-4-225, 4 place, cabin monoplane; show address, 89-99 Glenn Curtiss Airway.

Stearman Aircraft Company, Wichita, Kan.; representative, W. A. Warrick, Jr., Skyways, Inc., 21575 Lake Road, Rocky River, Ohio; 3 place, open, biplane; show address, 83-87 Orville Wright Airway.

Stinson Aircraft Corporation, Detroit Wayne Industrial Airport, Wayne, Mich.; representative, Wm. A. Mara; two "Junior" 4 place, cabin monoplanes; "Detroiter," 6 place, cabin, monoplane; "Wasp," 8 place, cabin monoplane; show address, 122-142 Glenn Curtiss Airway.

Stout Metal Airplane Company, Division Ford Motor Company, Dearborn, Mich.; three, tri-motor, cabin, monoplanes; show address, 28-52 Hoover Airway.

Taylor Brothers Aircraft Corporation, Bradford, Penn.; representatives, C. G. Taylor and W. B. Lenkard; "Chummy," 2 place, open, biplane; show address, 92-96 Lindbergh Airway.

Towle Aircraft Company, Inc., 261 St. Aubin Ave., Detroit; representatives, Tom Towle and J. N. Failing; "Towle" Amphibian, 8 place, cabin monoplane.

Travel Air Company, Wichita, Kan.; representative, C. V. Burnett, Curtiss-Wright Flying Service of Michigan, Grosse Ile, Michigan; Travel Air Cabin monoplane; 3 place, open biplane; Travel Air Mystery Ship; show address, 50-66 Lindbergh Airway.

Verville Aircraft Company, 7424 Melville Ave., Detroit, Mich.; representative, Alfred V. Verville; 3 planes; show address, 27-35 Orville Wright Airway.

Waco Aircraft Corporation, Troy, Ohio; representative, R. E. Lees; 3 planes; show address, 121-125 Orville Wright Airway.

Watkins Aircraft Co., Wichita, Kans.

Whittelsey Mfg. Co., Bridgeport, Conn.; representatives, H. Newton Whittelsey & F. W. Hazen; "Avian" 2 place, open, biplane; show address, 44-48 Lindbergh Airway.

Glider Exhibitors

Alexander Aircraft Corporation, Colorado Springs, Colo.; one glider; show address, 74-90 Lindbergh Airway.

Bowlus Sail Plane Company, San Diego, Calif.; 2 gliders.

Detroit Aircraft Corporation, Detroit, Mich.; 1 glider; show address, 74-84 Glenn Curtiss Airway.

Engine and Accessory Exhibitors

A-B-C Airline Corporation, 800 Bauch Building, Flint, Mich.; representatives, Talbert Abrams and G. A. Austin; aerial survey maps and aerial oblique views; show address, 58 Orville Wright Airway.

A C Spark Plug Company, Flint, Mich.; representative, E. M. Ginnis; spark plugs, oil pressure gauges, tachometers, altimeters, air speed indicators, instrument panels, fuel pumps and flame arresters; show address, 28-30 Ingalls Airway.

Aero Digest, 220 West 42nd St., New York City; representative, Frank Tichenor; publishers, "Aero Digest"; show address, 46-48 Orville Wright Airway.

Aero Supply Company, College Point, Long Island, N. Y.; aircraft accessories; show address, 137 Lindbergh Airway.

Aircraft Bureau, Detroit Board of Commerce, Detroit, Mich.; show address, 73 Glenn Curtiss Airway.

Aircraft Products Corporation of America, 7424 Melville Ave. Detroit, Mich.; representatives, Ralph R. Irwin, Robert S. Gans; oildraulic shock struts, landing wheels, tail wheels, pontoons, skiis and hulls; show address, 27-29 Davison Airway.

Airplane Model League of America, Cincinnati, Ohio; show address, 35 Ingalls Airway.

Air Reduction Sales Company, 342 Madison Ave., New York City; welding equipment; show address, 3-5 Young Airway.

Air Transportation, 1265 Broadway, New York City; representative, L. A. Nixon; publishers "Air Transportation"; show address, 40 Patrick Airway.

Air Travel News, 1500 Buhl Building, Detroit, Mich.; representative, Wm. B. Hall; publishers "Air Travel News"; show address, 16 Glover Airway.

Airway Age, 30 Church Street, New York City; representative, Ralph F. Duysters; publishers "Airway Age"; show address, 101-103 Lindbergh Airway.

Allied Products Corporation, 4646 Lawton Ave., Detroit, Mich.; representative, S. W. Hyatt; show address, 6 Moffett Airway.

Aluminum Company of America, Oliver Building, Pittsburgh, Pa.; representative, Frank Shoupe; Aluminum products; show address, 1-21 Fechet Airway.

American Cirrus Engines, Inc., Marysville, Mich.; representative, Glenn Muffley; aircraft motors; show address, 11-15 Young Airway.

Aqua Systems Incorporated, 2 Lafayette Street, New York City; representative, C. C. Main; Aqua hydraulic systems for storing and delivering gasoline at airports for fueling planes; show address, 4 Young Airway.

Aurora Equipment Corporation, Aurora, Ill.; representative, Val. C. Hetts; steel sectional equipment; show address, 2-4 Moffet Airway.

Aviation, McGraw-Hill Publishing Co., 10th Ave. at 36th St., New York City; representative, M. H. Newton; publishers "Aviation"; show address, 45-47 Hoover Airway.

Aviation Engineering, 52 Vanderbilt Ave., New York City, representative, B. S. Davis; publishers; show address, 5 Glover Airway.

The Balsa Wood Company, 158 Pioneer St., Brooklyn, N. Y.; representative, Jas. T. Downey; Lata Balsa Wood; show address, 77-79 Lindbergh Airway.

Bendix Aviation Corporation, 401 Bendix Dr., South Bend, Ind.; representative, Herbert L. Sharlock; hand inertia starters, combination hand and electrically driven inertia starters, direct electric starters, hand turning gears with and without booster magnetos, voltage-regulated engine-driven generators, double current engine-driven generators for aircraft radio, aircraft instruments and panels, aircraft magnetos, vertical double-type magnetos with distributors, radio-shielded ignition switches, aircraft carburetors; show address, 51-65 Lindbergh Airway.

Berry Brothers, Inc., 211 Leib St., Detroit, Mich.; representative, Thomas B. Colby; airplane finishes, dopes, pigmented or clear, thinners, lacquers, primers and surfacers; show address, 121-129 Lindbergh Airway.

Bethlehem Steel Company, Bethlehem, Penn.; Airplane Steels and Forgings; show address, 14 Ingalls Airway.

E. W. Bliss Company, 53rd Street & Second Avenue, Brooklyn, N. Y.; representative, R. W. Clark; "Bliss-Jupitor" Aircraft Motors; show address, 59-65 Hoover Airway.

Bohn Aluminum & Brass Corporation, 2512 E. Grand Blvd., Detroit, Mich.; representative, G. C. Brown; aircraft engine cylinder heads, pistons, crankcase, covers, valve seats, bearings, bushings, inducter spirals and bronze castings; show address, 31-33 Davison Airway.

Robert Bosch Magneto Company, Inc., 3601 Queens Blvd., Long Island City, N. Y.; representative, A. T. LeBlanc; electrical equipment; show address, 64-66 Orville Wright Airway.

Boston Insulated Wire & Cable Co., P. O. Station 25, Boston, Mass.; rubber covered wire and cable; show address, 4 Ingalls Airway.

Buhl Stamping Company, 2730 Scotten Ave., Detroit, Mich.; representative, W. C. Weiske; manifolds, nose cowlings, air scoops, air heaters and oil coolers for aircraft engines; show address, 3 Ingalls Airway.

Champion Spark Plug Company, Toledo, Ohio; representative, N. G. Amrhein; spark plugs for aircraft engines; show address, 93 Lindbergh Airway.

L. C. Chase & Company, 7338 Woodward Ave., Detroit, Mich.; representative, A. E. Roninger; Upholstery fabrics, mohair plush and artificial leathers; show address, 31 Ingalls Airways.

The Cleveland Pneumatic Tool Company, 3734 E. 78th St., Cleveland, Ohio; representatives, F. H. Burr, J. F. Wallace and E. W. Cleveland; Aerol Struts; show address, 10 Young Airway.

Chevrolet Aircraft Corp., Baltimore, Md.; representative, Louis Chevrolet; four-in-line inverted aircraft engine; show address, 53-55 Hoover Airway.

Chevolair Motors, Inc., Indianapolis, Ind.

Consolidated Air Travel Ticket Office, 139 Bagley Ave., Detroit, Mich. representative, Arthur Scheifle; air line information; show address, Hoover Airway, Gratiot Entrance.

Continental Aircraft Engine Company, 12801 E. Jefferson Ave., Detroit, Mich.; representative, Charles P. Russell; model A-70 160 H.P., 7 cylinder radial aircraft engine and working parts; show address, 26-30 Glover Airway. * * *

Curtiss-Wright Flying Service of Michigan, Grosse Ile Airport, Grosse Ile, Mich.; representative, C. V. Burnett; flying school; show address, 50-66 Lindbergh Airway.

Dayton Airplane Engine Company, Leo Street & B. & O. R.R., Dayton, Ohio; representatives, R. C. Davis, D. C. Bedwell, Paul T. King, Major M. H. Simmons, G. A. Funkhouser and F. Don Williams; aircraft engines; show address, 36-38 Ingalls Airway.

Detroit Free Press, Detroit, Mich.; show address, Administration Building.

Detroit News, Lafayette & Second Blvd., Detroit, Mich.; representative, James V. Piersol; show address, 117-119 Glenn Curtiss Airway.

The DeVilbiss Company, 300 Phillips Ave., Toledo, Ohio; representative, T. H. Deardorff; spray painting equipment; show address, 12 Glover Airway.

Dow Chemical Company, Midland, Mich.; representative, John E. Hoy; "Dowmetal" fabricated parts; show address, 33-35 Hoover Airway.

Edo Aircraft Corporation, First Avenue & Second Street, College Point, Long Island, N. Y.; representative, George B. Post; seaplane floats, show address, 41-43 Lindbergh Airway.

Electric Storage Battery Company, 8051 West Chicago Blvd., Detroit, Mich.; representative, Myron W. Turner; storage batteries; show address, 8 Ingalls Airway.

Elgin National Watch Company, Elgin, Ill.; representative, Gordon C. Gillis; aircraft instruments; show address, 47 Lindbergh Airway.

Ex-Cell-O Aircraft & Tool Corporation, 1200 Oakman Blvd., Detroit, Mich.; representative, William F. Wise; precision parts for aircraft engines; show address, 27-33 Lindbergh Airway.

Fairchild Airplane Manufacturing Company, Farmingdale, Long Island, N. Y.; representative, A. A. Woodruff; aircraft motors and aerial cameras; show address, 105 Lindbergh Airway.

Firestone Tire & Rubber Company, Akron, Ohio; airplane tires and rubber products; show address, 37-43 Hoover Airway.

Fleishman Transportation Company, New York City; Balsa Wood; show address, 10 Ingalls Airway.

General Electric Co., Schenectady, N. Y.

General Tire & Rubber Company, Englewood & Holmes St., Akron, Ohio; representative, A. G. Marenville; rubber products for aircraft; show address, 28-30 Orville Wright Airway.

The B. F. Goodrich Rubber Company, Akron, Ohio; representative, Harry Wacker; airplane tires and accessories; show address, 8-12 Moffett Airway.

Goodyear Tire & Rubber Company, Inc., 1144 East Market St., Akron, Ohio; representative, L. O. Guinther; airplane tires, tubes, accessories and air wheels; show address, 16-20 Patrick Airway.

Greenfield Tap & Die Corporation, Greenfield, Mass.; representative, Elmer Bryant; small tool equipment; show address, 7 Young Airway.

Greenleaf, Incorporated, 3127 E. Jefferson Ave., Detroit, Mich.; representative, W. H. Cleaveland; electrical units and carburetors for aircraft; show address, 5 Ingalls Airway.

Hamilton Standard Propeller Corporation, 221 West Seventh Street, West Homestead, Pa.; representative, Carl F. Schory; propellers; show address, 49-51 Hoover Airway.

Harwen Products Corporation, 423 West 218th Street, New York City; representatives, H. M. Richter and P. O. Stewart; Harwen Condensers; show address, 37 Ingalls Airway.

Haskelite Manufacturing Corporation, 120 South LaSalle Street, Chicago, Ill.; representative, C. E. Scott; Haskelite Blood Glue Plywood; show address, 73-75 Lindbergh Airway.

Hill Aircraft Streamliners, Inc., 818 Reedy Street, Cincinnati, Ohio; representative, J. A. Hill; N.A.C.A. cowlings, wheels fairings, spinnings, fuel tanks and special parts; show address, 8 Young Airway.

The Imperial Brass Manufacturing Company, 1200 West Harrison St., Chicago, Ill.; representative, Frederick C. Shafer; vibration proof tube fittings; show address, 13-15 Ingalls Airway.

International Nickel Co. Inc., 67 Wall Street, New York City; representative, H. S. Lewis; nickel alloys used in aircraft engines; show address, 38-40 Orville Wright Airway.

Johns-Manville Corporation, 292 Madison Avenue, New York City; representative, John P. Syme; show address, 31 Young Airway.

Irving Air Chute Co., Inc., 372 Pearl Street, Buffalo, N. Y., representative, D. A. MacLeod; parachutes and accessories; show address, 37-39 Lindbergh Airway.

Johnson Airplane & Supply Company, Dayton, Ohio; representative, P. M. Fouts; accessories and supplies; show address, 34 Young Airway.

Kelton Aurand Manufacturing Company, Bay City, Mich.; representative, C. E. Stone; airplane seating equipment; show address, 9 Young Airway.

Kendall Refining Company, Bradford, Penn.; representative, I. H. Shearer; aviation motor lubricants; show address, 25-27 Glover Airway.

Kinner Airplane & Motor Corp., 635 W. Colorado Blvd., Glendale, Calif.; representative, R. Ernest Tucker; aircraft motors; show address, 36-38 Glover Airway.

LeBlond Aircraft Engine Corp., Madison & Edwards Ave., Cincinnati, Ohio; representative, Glenn D. Angle; aircraft motors; show address 60-62 Orville Wright Airway.

Lee Machinery Company, 6318 E. Jefferson Ave., Detroit, Mich.; representatives, A. J. Campbell and L. E. Curtiss; South Bend Lathes; show address, 36-38 Young Airway.

The Leece Neville Company, 5363 Hamilton Avenue, Cleveland, Ohio; representative, Arthur A. Skinner; aircraft motor accessories; show address, 30-32 Young Airway.

Light Mfg. and Foundry Co., Pottstown, Pa.

Lycoming Manufacturing Company, Williamsport, Penn.; representative, T. H. "Doc" Kinkade; aero engines; show address, 9-13 Davison Airway.

Macwhyte Company, Kenosha, Wis.; representative, Jessel S. Whyte; streamline wires, round drawn tie rods, safe lock terminals, aircraft wires, strand cord; show address, 135 Lindbergh Airway.

Metallurgical Laboratories, Inc., Philadelphia, Pa.

E. B. Meyrowitz, Inc., New York City.

Michigan Aero Engine Corporation, South Hosmer Street, Lansing, Mich.; representative, Ted Lundberg; inverted four-in-line, air cooled aircraft engine; show address, 42-44 Orville Wright Airway.

Murphy Varnish Company, 224 McWhorter St., Newark, N. J.; representative, Milton R. Warnock; aircraft dopes and lacquers; show address, 35 Glover Airway.

National Air Pilots Association, Cleveland, Ohio; representative, C. F. Egge; show address, Administration Building.

National Aeronautic Association, 910-17th Street, N. W., Washington, D. C.; show address, 12 Ingalls Airway.

National Glider Association, Union Trust Building, Detroit, Mich.; representative, Donald F. Walker; show address, Hoover Airway, Gratiot Entrance.

Nicholas-Beazley Airplane Company, Inc., English & North Streets, Marshall, Mo.; representative, Mr. Van Zant; airplane parts and accessories; show address, 95-99 Lindbergh Airway.

Norma-Hoffman Bearings Corporation, Stamford, Conn.; representative, H. T. Ritter; ball, roller and thrust bearings; show address, 22-24 Patrick Airway.

The Ohio Seamless Tube Company, Shelby, Ohio; representative, C. H. Wood; seamless tubing; show address, 11 Ingalls Airway.

Packard Motor Company, 1580 E. Grand Blvd., Detroit, Mich.; representative, G. H. Brodie; aircraft motors; show address, 13-15 Hoover Airway.

Parks Air College, 261 Missouri Building, St. Louis, Mo.; Aircraft School; show address, 29 Young Airway.

Posey Manufacturing Company, Haquiam, Washington; representative, E. J. Fishbaugh, 313 South Elmwood Ave., Chicago, Ill.; aircraft spruce; show address, 35 Ingalls Airway.

Pratt & Whitney Aircraft Corporation, Hartford, Conn., representative, Stout Air Services, Inc.; aircraft motors; show address, 14-22 Moffett Airway.

The Prospect Fire Engine Company, South Elm St., Prospect, Ohio; representative, H. E. Thomas; fire & crash truck; Apron of Show Building.

Quaker State Oil Refining Company, Oil City, Penn.; representative, W. S. Shannon; aircraft lubricants; show address, 1-3 Glover Airway.

Richfield Oil Corporation, 122 East 42nd Street, New York City; representative, Fred L. Foster; aircraft gas and oil; show address, 8 Glover Airway.

Rome Wire Company, Division General Cable Company, Rome, New York; representatives, H. C. Joos and C. R. Evans; molded ignition assemblies, airport lighting cable; show address, 89-91 Lindbergh Airway.

H. H. Robertson Company, Grant Bldg., Pittsburgh, Penn.; representative, F. C. Russell; airplane hangars, roofing and siding sheets, ventilators, skylights and sash; show address, 81-83 Lindbergh Airway.

John A. Roebling's Sons Co.; 640 South Broad Street, Trenton, N. J.; representative, E. M. Dixon, aircraft wire products; show address, 7 Ingalls Airway.

B. Russell Shaw Company, Inc., Arcade Building, St. Louis, Mo.; representative, B. Russell Shaw and O. S. Edgington; airport models; show address, 85 Lindbergh Airway.

Shell Oil Company, St. Louis, Mo.; representative, James Doolittle; aircraft oils; show address, 49 Lindbergh Airway.

Sinclair Refining Company, 45 Nassau Street, New York City; representative, L. P. Lochridge; fuel and lubricants; show address, 37-39 Glover Airway.

Skelly Oil Company, Skelly Bldg., 4th & Boulder Sts., Tulsa, Okla.; representative, M. E. Callender; aviation products; show address, 32-34 Orville Wright Airway.

SKF Industries, Inc., 40 East 34th Street, New York City; representative, George R. Holmes; ball and roller bearings; show address, 36-38 Patrick Airway.

Sky Specialties Corporation, 3651 Hart Ave., Detroit, Mich.; representative, F. B. Stover; Heywood Starters and accessories; show address, 35-37 Davison Airway.

Snap-On Wrench Company, 4450 John R., Detroit; Mich.; representative, R. B. Campbell; tools for airplane and motor assembly, maintenance and repair; show address, 33 Young Airway.

Society of Automotive Engineers, 29 West 39th Street, New York City; representative, A. J. Underwood; show address, 6 Young Airway.

A. G. Spaulding & Bros., 105 Nassau Street, New York City; representative, H. R. Hart; aviation clothing; show address, 26-28 Patrick Airway.

Standard Oil Company of Indiana, 910 South LaSalle Street, Chicago, Ill.; representative, J. P. Porter; aircraft oils; show address, 12-16 Young Airway.

Stewart Hartshorn Company, 250 Fifth Avenue, New York City, representative, H. W. Watts; streamline external and square internal aircraft tie rods with fittings; show address, 35 Lindbergh Airway.

Stout Air Services, Inc., Ford Airport, Dearborn, Mich.; representatives, William B. Stout, Stanley E. Knauss, Glenn G. Jury, Donald J. Rogers, Peter Berger, Ralph B. Galbraith, LeRoy A. Slauter, Elno D. McGlone and Winston Healy; Air Line information and literature; show address, 14-22 Moffett Airway.

Harry Stutz Aircraft Motor Co., 3554 College Avenue, Indianapolis, Ind.; representative, Harry Stutz; aircraft motor; show address, 36 Orville Wright Airway.

Summerill Tubing Company, Bridgeport, Penn.; representative, S. L. Gabel; aircraft tubing and accessories; show address, 107-115 Lindbergh Airway.

The Texas Company, 332 So. Michigan Avenue, Chicago, Ill.; representatives, Geo. R. Turner, W. P. Ross & H. N. Steindler; aircraft oils; show address, 3-5 Davidson Airway.

Thompson Aeronautical Corporation, 2011 Union Trust Building, Cleveland, Ohio; representative, Charles Rheinstrom; airline information and literature; show address, 32-34 Ingalls Airway.

E. S. Twining & Company, 320 Broadway, New York City; representatives, John H. Twining and Val Dietz, Jr.; airplane fabrics; show address, 9 Ingalls Airway.

Universal Engineering Company, Frankenmuth, Mich.; representative, W. R. Fisher, bushings and tools; show address, 29 Glover Airway.

U. S. Post Office, Detroit, Mich.; show address, Administration Building.

United States Rubber Company, 6600 E. Jefferson Ave., Detroit, Mich.; representative, J. A. Faucher; airplane tires and rubber mechanical goods; show address, 50-56 Orville Wright Airway.

Vacuum Oil Company, 61 Broadway, New York City; representative, E. J. Snow; aircraft oils; show address, 25-27 Young Airway.

Warner Aircraft Corporation; 20263 Hoover Avenue, Detroit, Mich.; representatives, Willis C. Brown and E. N. Hartwick; aircraft motors; show address, 27-31 Hoover Airway.

Western Electric Company, 195 Broadway, New York City; representative, H. N. Willets; aviation radio telephone systems; show address, 131-133 Lindbergh Airway.

Western Flying, 145 S. Spring Street, Los Angeles, Calif.; publication, "Western Flying"; show address, 7 Davison Airway.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Penn.; representative, P. H. Grunnagle; Macarta propellers, pulleys, etc., airport lighting equipment; show address, 9-15 Glover Airway.

Westinghouse Lamp Company, Grand Central Palace, New York City; representative, William A. Massey, Airport Lighting Equipment; show address, 7 Glover Airway.

Willard Storage Battery Company, 246 East 31st. St., Cleveland, Ohio; representative, C. T. Klug; storage batteries; show address, 31 Glover Airway.

Wilson Steel Products Company, 49th Street and South Western Ave., Chicago, Ill.; representative, Charles Arens; Arens controls; show address, 6 Ingalls Airway.

Wyman-Gordon Company, 105 Madison Ave., Worcester, Mass.; representative, F. E. Wellington; crank case forgings; show address, 12-14 Patrick Airway.

Ypsilanti Reed Furniture Company, Ionia, Mich.; representative, Fred M. Cleaveland; airplane seating equipment; show address, 29 Ingalls Airway.

THE *Aircraft Market* IN

An Informative Discussion of Past and Present and the Prospects for Future Aircraft West of the Great Divide

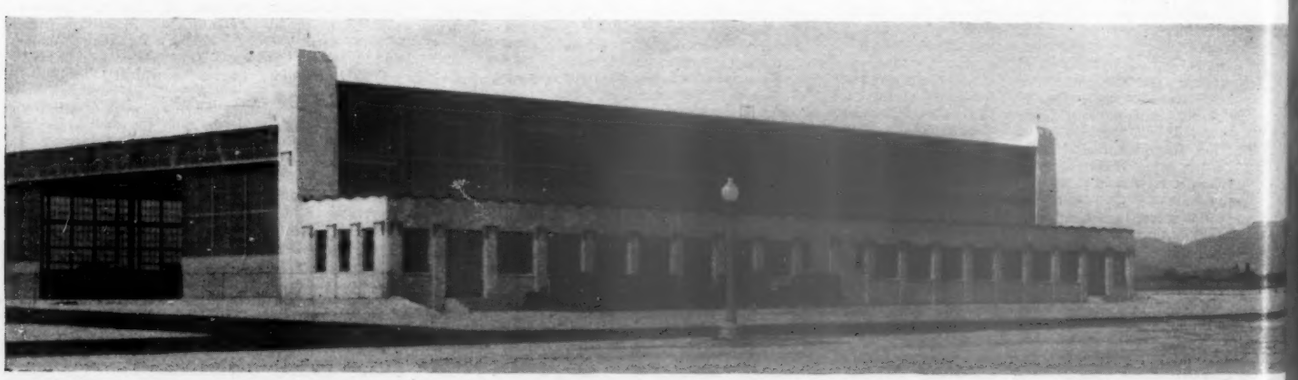
By CHARLES F. McREYNOLDS
Pacific Coast Editor of AVIATION

SALES of any product follow the law which governs running water, in that the greatest volume will flow, either along the path of least resistance, or along the path of greatest preparation. To this law the sale of aircraft is no exception. The fact that more airplanes have been sold in California than in any other state of the union thus takes on particular significance for the entire aviation industry. Either conditions are such in California that airplanes can be sold there more easily than in other portions of the country, or a better organized and more intensified sales effort has been made there, or possibly there has been a combination of both conditions. In any case there must be in this situation lessons of a vital nature for everyone interested in promoting the sale of aircraft. Therefore California deserves a special place in any general sales analysis of the aviation industry. Such an analysis should properly consider two separate phases of the far-western situation. First: What lessons can the rest of the industry take from a study of what has so far been the world's best market for commercial airplanes? Second: In view of the past and present sales situation in California, what is the prospect for future sales in that territory?

Because the entire industry is now seeking markets for aircraft the first of the two points mentioned above will be given primary consideration. The questions most frequently heard within the industry for the past six months have been: Where is the aircraft market?, and How big is the aircraft market? Too often one has been given the impression that the askers of these questions were actually seeking a market for surplus stocks of airplanes or for inflated production, instead of making a sincere and scientific effort to determine how many of what sort of airplanes could be economically used where.

CALIFORNIA and the Southwest has been generally recognized as an ideal year-around flying country, in a section where business in general is more nearly "as usual" the year around than in any other territory, and where "seasonal sales slumps" are less felt in the aircraft market. Because of this continued selling season, and because the organized Spring flying and selling season opens much earlier in the West, it is possible to "feel" the market trend considerably in advance of the rest of the country.

Bearing these facts in mind it is of real import to know that as late as March of this year California still shares, with the rest of the country, a sales slump of major importance. One of this state's leading distributors of aircraft, a company handling one of the most



Affording comfort and convenience to the air passenger in the West. A hangar and terminal building on the n

THE *West*

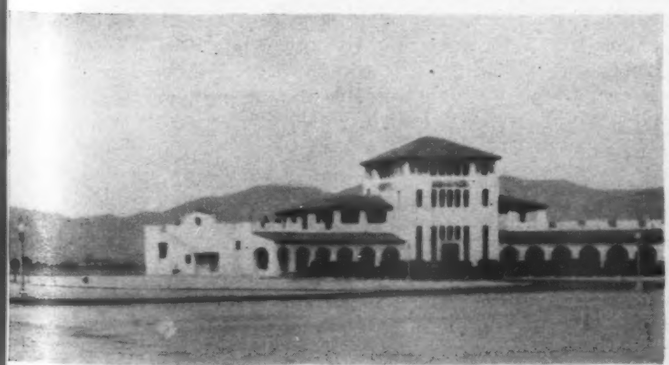
Developments, Sales

View of Los Angeles Municipal Airport from the Administration Building

popular planes on the market, in an extensive territory, has gone bankrupt since the first of the year. Another leading western distributor, with a well organized dealer group, and handling a line of popular planes completely covering the market, reports no new plane sales at all since November, 1929. Perhaps of equal significance is the fact that most of the small aircraft dealers have ceased to function so far as any organized sales effort is concerned. Also of interest is the announcement by a leading finance company that it will undertake no further aircraft financing of any sort for an indefinite period. Other finance companies are handling aircraft on only the most conservative terms and the general situation is not one to stimulate volume airplane sales on the time payment plan.

Such a picture as that painted by the above sentences, if taken alone, would forecast a rather hopeless sales outlook for California, and for the entire country. However, there are other factors in evidence which give us a better conception of the true market possibilities; the gloomy reports rendered above having served to indicate how real the aircraft sales slump has been in the active California market, and that up to the latter part of March there is no definite revival of new plane sales.

In sharp contrast to the dull market in new planes is the general report that used plane sales, at comparatively low prices, are very active. Both the Los Angeles (municipal), and the Los Angeles Metropolitan Airport, have reported quantity used plane sales recently, in addition to an awakening interest in new planes, extending only to demonstration flights. Edward L. Erickson, pioneer used plane broker of Southern California, states that his business during February of this year exceeded in volume any previous month. Various dealers report an encouraging interest in new planes among prospects who can afford to buy if convinced that they should purchase a new plane. These reports indicate that a normal seasonal interest is reviving, and of more importance, that a considerable volume of sales is developing where prices are sufficiently attractive. Other encouraging reports come from such factories as Bach and Lockheed.



United Airport at Burbank, Calif.

PROBABLY the most cheering news of all is that flying of all sorts in the West is on the up grade. Standard Flying Schools, Curtiss-Wright Flying Schools, and others in the Los Angeles area; Boeing School of Aeronautics, in Oakland, and other flying schools up and down the Pacific Coast report increasing student enrollments. General service operations, taxi work, crop dusting, survey flying and charter trips are all proceeding at a normal rate for this season, with the total volume of flying mounting rapidly. The major air lines are carrying a steadily increasing volume of passengers, with T.A.T.-Maddux, and Western Air Express operating at a consistent average of 60 per cent of full load, or better. Since such activities are the backbone of the aviation industry and provide the major dependable market for aircraft, we may be fairly sure of continued progress in all elementary branches of aviation, no matter how the broad public market for airplanes may

develop, or fail to develop. Certainly the general public is using the air mail, the air transport lines, and other air services in steadily increasing volume. We may, therefore, grant that aviation as a service has arrived and will never be supplanted, unless by some superior and speedier form of transit. Therefore all who build for and sell to the "service" portion of the industry, or what is known as our "internal" market, may rest assured that they have a permanent place in the industrial life of the country. It is that portion of the industry which has been handling aviation as a "commodity," and which has been trying to merchandise the airplane to the general public which must fight for its life during the next few months, and possibly years.

Returning to the simile with which this article opened, that airplane sales, like running water, will follow the line of least resistance unless artificially restrained, we may analyze the California market which has absorbed per capita four times as many planes as the country at large. Sales naturally flowed to this territory in the beginning because the weather permits year-'round flying, the great distances out here make a high percentage of flying economical for many men and companies, because topography of this territory offers great obstacles to the development of surface transport systems. With this acceptance of the airplane came an almost simultaneous establishment of large airplane sales and service organizations. Splendid airports were built, flying schools prospered, and in anticipation of continued expansion of aircraft sales many of the dealers stocked up heavily. The recent slump has awakened the industry in California and the West to the fact that when popular buying stopped, sales stopped. The sales and service facilities are as good as ever. The artificial channels as organized to handle a buying market are still in existence, but since the market situation has changed the aircraft distributing organization has been virtually paralyzed.

As a matter of fact, the popular private market for airplanes has never existed and does not now exist. Nor will it exist until we have in the field strong groups, perhaps symbolized by the General Motors-Fokker combination, which can afford to undergo a pioneering period possibly extending into years. Naturally, it is not to be expected that all aircraft manufacturers with commercial ambitions must be backed by as wealthy and powerful a group as General Motors. But it does seem essential that most builders and distributors of commercial aircraft be underwritten, either by a differing industrial activity, or by a military or aerial "service" hook-up guaranteeing profits, in such a way that sales efforts devoted to the gradual building up of the public market may be extended over a considerable length of time before any dividends may be expected back from such activities. Of course there will be exceptions to this general situation, and some companies of unusual merit and courage will probably continue through the lean years to the larger markets of the future, without any subsidies along the way.

FOR THE MOST PART, thought, the development of popular sales demands a renovaton of the industry from stem to stern. Artificial channels must be set up which will promote the direct flow of planes from the factory to the purchaser. This does not necessarily mean direct factory to purchaser selling, but it does mean direct analysis of all market problems by the manufacturer, design and production in types and quantities to satisfy those markets, and distribution through channels sufficiently powerful to ensure that the right kind of aircraft will be marketed in the right amounts. Such a set-up again emphasizes the need for manufacturing groups powerful enough to conduct the necessary market research, spend the money for specialized design and production, and allow sufficient distributor discounts to ensure satisfactory sales effort. Along with this program it will probably be essential to conduct a sound advertising program of major proportions. If the aviation business is not prepared to conduct such an effort, or is not able to do so, it is apparent that the industry will develop very slowly along strictly "trade" lines with the widespread adoption of the airplane by any considerable portion of the public definitely postponed until some future date. If the latter condition should develop, which is hardly to be anticipated, it is evident that distributing systems would be unnecessary and that all air lines and schools would deal direct with the factory, handle their own servicing, as at present, and leaving the private owner to shift for himself.

If, on the other hand, the aviation industry is really going to organize sensibly for an effort to develop sales outside the industry it is evident that we must go out and create new markets. In this respect there are numerous examples at hand of market creation by the manufacturers and distributors of other products which were not naturally accepted by the public and had to be intensively promoted.

WHILE it must be confessed that the airplane is perhaps more complex in design, manufacture, and marketing than some of the products of other industries, the basic principle of pioneering the market remains the same. Stated harshly the developing of a popular airplane market is a job for the "big boys" and would probably best be left for them to handle at such a time as the prospects for real profits appeal sufficiently to them to warrant the effort and expense of a campaign. The rapid development of basic flying and the acceptance of elementary air transport services indicates that the time for such a campaign is at hand. In the meantime the small manufacturer of aircraft will completely disappear except in special instances where a local economic condition, or an isolated case of personal genius, justifies his continued existence.

Some of the stronger units now active in the market are preparing for such an effort as has been outlined above. Some of the methods to be followed are indicated by certain California activities. Every effort must be made to force the expansion of the basic aviation industry through developing new applications for the airplane. One such is the adoption of the airplane by a California mining company for transportation in connection with a mining project in Borneo. Having found itself in possession of a valuable mining property some miles inland from the coast engineers reported that the cost of a road to the site of the proposed mine would be prohibitive. A study of the airplanes was made and it was found that by redesigning some of the mining machinery, and by properly selecting and equipping the planes for the job, that the mining operation could be economically conducted with airplanes as the only mode of transportation. This is but one example of specialized application of the plane to one branch of a great industry, among many great industries. It is fair to assume that if plane manufacturers would study the mining industry they could find many ways of serving

it. Specialized applications to other industries would call for a large number of planes annually and would steadily win an increasing acceptance for the airplane as an indispensable cog in the world's industrial and commercial organization. An intensive study of the needs of all great industries such as power, mining, lumbering, oil production, cattle raising, ranching, banking, real estate, moving pictures, automotive, machinery, clothing, shoes, national chain store systems and so on at great length, can hardly fail to yield many new outlets for the capabilities of aircraft.

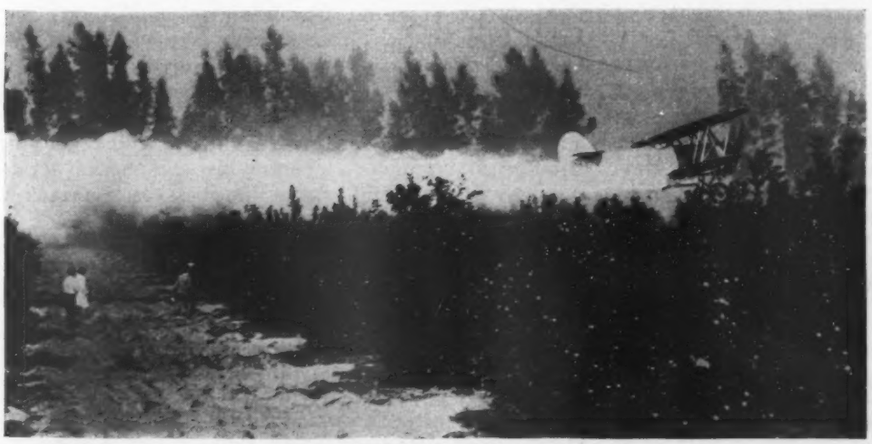
IN DEVELOPING the aviation service industry California offers many examples of intensive application of the plane. Several amphibion planes have been placed in service operating between land fields near Los Angeles and water ports at Catalina Island, Balboa, Lake Arrowhead and other mountain resorts. A number of amphibions have been placed in service on ferry lines across Puget Sound, at Seattle, and across San Francisco Bay, at San Francisco. These amphibion planes take off from and alight on the water, but lower their wheels and run up board runways to a dry platform for loading and unloading passengers. Such services have proved of great value to the cities served, and offer a fine example of the airplane applied where it can best display its own peculiar talents. There are other examples of special passenger and freight lines, which illustrate how every new and reasonable development of airplane services expands the internal market for airplanes and gains increased acceptance of the plane among business leaders and the public in general.

For the "private market" which the manufacturers must eventually develop we can only plead for a continued building of foundations and ground work upon which the future private market may be expanded. Aviation country clubs and organized flying by women are two activities which manufacturers may well subsidize as an entering wedge to the private market. It is hardly necessary to point out that such an activity will provide a limited present market for private planes, and will do much to hasten general acceptance of the airplane for private pleasure and sport flying.

Another plan of even greater significance is that of the flying club organized among the employees of companies engaged in aviation activities. Two examples of such clubs are found in the Shell Flying Club, organized among employees of the Shell Oil Company of California, and the Kinner Flying Club, organized by employees of the Kinner Airplane and Motor Corp., Glendale. Although this plan is not entirely new it has certainly never been given the attention which it deserves. Every person who is earning his bread and butter through a connection with the aviation industry not only is personally interested in flying, but it is to his financial interest to see to it that flying is popularized. If every airplane factory, every aircraft engine factory, every large operator or distributor of aircraft, and every large company intimately associated with aviation, such as the large oil and rubber companies, would sponsor such flying clubs within their own organizations we could set up overnight a hundred or so strong flying clubs. These clubs would give their members an active outlet for their enthusiasm for aviation, and would result in a nucleus around which private flying could be expanded. Even one hundred such clubs, with only twenty members each, would give us two thousand private flyers who would be using aviation products, increasing the amount of flying being done, and selling the idea of private flying to all of their friends and acquaintances. Aeronautical concerns could well afford to make sacrifices in starting such clubs; furnishing materials at cost and arranging financing for the operations, possibly through a direct salary levy.

THE METHODS outlined above by which the internal market, the business market, and the private market might be expanded, constitute California's contribution to plans for improved merchandising methods. Of more vital importance is the major situation, as indicated by conditions in the Southwest, which calls for fewer and stronger factories, fewer and stronger distributors, a scientific campaign controlled by the manufacturers, with heavy financial backing, and the provision of a financial and industrial background of an independent nature for both manufacturing and distributing organizations. Plainly, there are aircraft markets now open and expansion of markets can be expected; but there is little probability of tremendous profits from aircraft manufacture and sales for several years to come.

Reverting to the second phase of the Western market, as mentioned in the introduction to this discussion, we may well devote some attention to the possibilities for early sales in the California and Pacific Coast market, for no matter how the aviation industry may conduct its future operations, there are at present many airplanes yet unsold. Offhand, the California market might be considered a poor field for new plane sales in view of the high rate of saturation which was reached there as early as 1928. This view would be supported by the fact that used planes are selling now while new plane sales are at a standstill, and also by the fact that more actual sales were registered in California during 1928 than 1929. However, there are two optimistic viewpoints to be considered. Replacement sales must continue at an active pace in a territory where large num-



Dusting an orange grove near Santa Ana, Calif.

bers of aircraft are being subjected to steady use. Also, the early saturation of the immediate market has resulted in wide usage of the plane on the Pacific Coast, and due to the tendency in the present market for every airplane properly used to eventually sell two more planes, it is logical to anticipate a substantial secondary market among persons not actually connected with the industry or who have not as yet been so connected.

To set any definite figure on the future California market would be like trying to predict in advance the number of eggs that a hen might lay. The only logical procedure is to study the hen's past performance, give her the proper attention, and let nature take its course.

STUDYING the past performance of the Western, and particularly the California market, we find available some significant data. Taking our figures from the United States Department of Commerce, Aeronautics Branch, and from the last United States Census report, we find that the eleven Mountain States, with a population representing 7.6 per cent of the total for continental United States has 18.7 per cent, or almost one-fifth of the registered aircraft, and that California alone has 12.4 per cent of all registered aircraft. To still further illustrate the manner in which the Pacific Coast market is concentrated it may be stated that 84.8 per cent of planes registered in the 11 Western states are registered in the three Pacific Coast States of California, Oregon, and Washington; and that 66.2 per cent of the Western total, or approximately two-thirds, is located in the single state of California. Numbers of airplanes, if taken alone, would mean little. Figures on pilots and mechanics registered from the various states throw further light on the intensive nature of activities in California. Of the total number of pilots registered to date, 10,215 according to the latest Department of Commerce bulletin, 2,076 or 20.3 per cent are located in California. This number is more than double the pilots registered in the next state, New York, which has a total of 1,007. Also of significance is the fact that while California more than doubles any other state in number of pilots of all classes, when transport pilots alone are considered the State of California leads the next state by more than three to one. In mechanics licensed California has 1,461 of a total of 7,624, or 19.1 per cent or approximately one-fifth of the nation's total and about twice the figure for New York, the next best state, which lists 733 mechanics. When these figures are taken together it is evident that California not only has more planes, but, with three times the number of transport pilots and twice the number of mechanics for a like number of planes registered in the next most active state, must be using those planes much more intensively. This intensive use means more rapid replacement. For some idea of what this replacement market might be we may arbitrarily take the figure of three years as the useful life of a commercial plane. California has 1,222 planes registered so that if all of these were worn out in the three years we should have an average yearly replacement of 407 airplanes. This is probably an optimistic figure, especially in view of the fact that a very large proportion of California planes are now brand new and will not be worn out for another three years, so that the replacement market may not develop fully until 1932 or '33. However, the prospects for a good replacement market are so good that considerable attention may well be given to such sales in this territory.

As to the market for new planes, considering that there is such a market, even though limited, the fact that most buying of planes is still done by or through pilots, or upon their recommendation, may well be borne in mind. California, with double the number of pilots of any other state presents a concentrated market with twice the theoretical buying power of any other like portion of the country.

CONSIDERING the market from the standpoint of sales to the general public, which sales will depend upon the relative airmindedness of the persons in competing territories, an analysis of Census figures against aircraft registrations shows that California, although eighth state in population has a total of more planes than any other state, and has practically double the number of planes of any other state excepting New York. On a per capita basis California has 2,12 times as many planes per person as the next best state, Missouri; 3.11 times as many as the most populous state, New York; 3.28 times as many at the average of the eight most populous states; and 3.82 times as many planes per person as the average for the entire United States. On this basis it would appear that the far western territory is approximately four times as well sold on the airplane as the country at large. Since there are 2,804.3 persons for every plane in California it is evident that there is still room for improvement. However, accepting the proposition that the Western market is four times as active as the country at large it seems logical that four times the sales effort should be expended there in an attempt to take advantage of the evident willingness to accept the airplane.

So far as the machinery for this sales effort is concerned, there are two important phases to be considered. California is particularly well organized for automobile travel and for air travel. There are many large distributors of automotive products who might be sold on the advantages to themselves of a close connection with a strong airplane manufacturer. Under such an arrangement there would be placed at the disposal of the aircraft sales program a thoroughly organized sales and service organization which could adequately handle aircraft at a lower overhead cost than can the independent distributor. This hook-up with strong automotive interests has not yet been generally effected in this territory. For sales headquarters the terminal ports of the major airlines offer splendid facilities. Large hangars, perfect runways, and a complete staff for handling field operations and the general public are all available at such fields as Oakland Airport, Los Angeles Airport, Grand Central Air Terminal, Glendale; United Airport, Burbank; Los Angeles Metropolitan Airport, Van Nuys; Clover Field, Senate Monica, Aero Corporation Airport, Los Angeles, and other well established fields. Placing of the sales and service headquarters on such fields is a desirable move, rather than for the individual distributor to attempt to operate his own aerial service company, school, and charter business as a means of carrying the overhead incident to his sales work.

In conclusion we may state that the trend of the market in the West indicates the continuance of a limited rational market for practically all types of planes, with most sales to be made to the industry itself, and with the best market still on the coast. There is no indication here of an early expansion of the private market, and the only hope for great expansion of markets in general lies in extensive pioneering work by very large groups which can afford to sacrifice profits for several years to come while building for the future.

WHAT IS THE MATTER WITH OUR *Advertising?*

By JOHN HENRY KUNKEL
General Manager, The Essig Company

THE QUESTION asked by the title of this article is not an unfamiliar one. Those very words have been uttered verbatim by practically every executive of every company in every industry at some point or another during his career.

Since the aviation industry is beginning to advertise in a big way, it may not be amiss to ask that question of ourselves without applying it to the advertising of any one company in particular, but to aviation advertising as a whole.

The writer does not believe that the maximum sales value of advertising is being extracted by aviation companies whose advertising is appearing today. These campaigns are not good. Neither are they bad. They are lukewarm, and therein lies their fault.

A survey of our current campaigns reveals a tendency to advertising for the sake of advertising, rather than to advertise for sales. We are advertising because we either feel it is a necessary evil, or else because we feel it is the accepted thing to do.

This is not the fault of advertising managers. It is not the fault of advertising agencies. It is not the fault of the executives of airplane companies. The reason is found in the fact that the entire energies of our aircraft companies have been concentrated on the problem of financing and developing production. Advertising has had to take second place. It had to carve its own way and get along as best it could.

The time has come, however, when this situation must change.

The aviation industry faces a major problem more difficult than financing and production. It must develop a market for airplanes to absorb the production we have so industriously developed in order to produce dividends to satisfy stockholders whose money has made that production possible.

Advertising now becomes a definite sales factor. It is the force which must be depended upon solely to create this needed market. It must pave the way for airplane salesmen. It must soften the hearts and open the purse strings of hard boiled buyers who must be changed in their attitude from highly skeptical and stiffly resistant to an attitude that is open and receptive. It must batter down all preconceived negative ideas in the minds of prospective prospects, and replace them with ideas that are favorable.

AVIATION ADVERTISING has been dealing in generalities. For the purpose of illustration, let's review the type of airplane advertising that has been appearing lately in leading business magazines. It has been inserted, obviously, for the purpose of interesting the executives of leading industrial and commercial organizations in the purchase of airplanes. and the application of the airplane to the furtherance of their respective businesses.

In the title of many of these ads we have told our executive-readers something like this: "Your Sales Manager Can Travel From Oskosh to Walla Walla in Less Time by Air!" The copywriter picks up the scent suggested in the title and proceeds to follow the theme. After the reader-executive has finished reading the advertisement he knows nothing more than he suspected before he ever saw the advertisement. He knows his sales manager can fly from point to point faster by air. The advertisement sold him nothing. This suggests a solution to our problem.

Advertising must cease to "advertise." It must *Sell!* Copy and titles can no longer deal in generalities or

The well known adage about building a mouse-trap and living in the woods, may have held true in Emerson's day, but twentieth century business success requires not only quality goods but quality advertising. ¶In Mr. Kunkel's opinion aeronautical advertising is far below par, and in this article he relates of its present ills, and of the important part that it can *play in boosting aeronautical sales volume.*

mere conjectures. Advertisements must begin to deal with *Facts!*

In preparing our advertisements let us consider our audience. Again for illustration purposes, let us consider the industrial-commercial market. Our audience is composed of executives. They have an interest in common. All seek ways and means of increasing the operating efficiency of their companies and thereby increasing their revenue.

The airplane manufacturer who first breaks an advertising campaign that shows in figures and in facts how the industrial and commercial users of his plane are increasing efficiency and profits will accomplish much in preparing for his salesmen a far, far larger market than he has to sell now.

To be specific, that campaign will show in a series of advertisements how an oil company is using airplanes to its profit. Another advertisement will show how a mining company has applied the airplane to its particular problems to the end that operating efficiency has been aided. Another advertisement in the series will tell how a Pacific Coast department store buyer picked up the latest Paris fashions right from the steamer docks in New York and flew them to the coast for display and advance sale before competitors were able to get them ready for rail shipment. One such advertisement will tell how a sales manager swung around the territory just before a big sales campaign broke, and through contact with his sales force was able to secure the whole-hearted co-operation of his selling force to the end that more sales were secured during the campaign than ever before.

THE ABOVE THOUGHTS are mere suggestions of how certain commercial users may be applying the use of airplanes with profit. If aircraft manufacturers will dig in with their users the chances are they will secure enough facts to prepare a campaign that will prove the airplane profitable and efficient.

And in preparing such a campaign the advertiser should use actual firm and executive names. He should be specific. If Oscar Martin is the president of the Martin Valve Manufacturing Company and his company supplies the material for one of the advertisements, the ad should not say, "Of course this is not the real name. It will be supplied on request;" But should come right out with the fact that the Martin Valve Manufacturing Company is using the advertiser's airplane and Oscar Martin, president of the company says that its use has produced a profit. He should play that up for all it is worth, and if it is done right it will be worth a great deal!

It the advertisement deals with how an oil company is using its plane, or fleet of planes to the end that they have proved profitable, then the plane manufacturer should key that advertisement in illustration, in title, and in text to appeal to the executives of other oil companies who may read the ad. However, after that is done, the matter should not be permitted to rest there. If the airplane manufacturer has definitely proved that his product is a profit producer in some particular line of commercial or industrial endeavor, he should get the idea to other executives than those of this particular industry that because the airplane has proved a good investment for the "Williams Petroleum Corporation" it can prove an equally sound investment to other industries in other lines. Such suggestions in an advertisement should be strongly backed by the suggestion that the executive interested write to the manufacturer to find out how this can be done! Thus it is possible to open up a tremendously effective direct mail campaign upon the strength of correct publication advertising.

OF COURSE no manufacturer should expect his advertising to stand on its own feet, alone, but should back his advertising campaigns with well directed sales offensives. When an advertisement, or series of advertisements, is dedicated to the use of the plane by oil companies the sales department should back up this advertising with a strong drive on all oil companies, and similar or allied industries.

By co-ordinating dealer effort, factory sales plans, and the general advertising campaign it is possible to extract the maximum advantage from advertising. If advertising is to sell, at this time when two-fisted selling is so badly needed, then it must be understood and handled as a sales tool of the most powerful sort, rather than as the necessary evil which it has been so mistakenly considered by many up to the present time. Advertising is the most powerful of all sales methods, and it must be used intelligently as such.

An example of billboard advertising of a combination automobile and airplane distributor.

STATISTICAL SOURCES FOR *Market Analysis*

Concerning Available Statistics and Their Value to Aero Sales

By FOWLER W. BARKER
Assistant Chief, Aeronautics Trade Division, Bureau of Foreign and Domestic Commerce

THE MERCHANDISING PROBLEM before the aeronautic industry today is not merely that of bringing buyers and sellers together. In the past, those who wanted to fly, and had the money, investigated different aircraft, spent a lot of time around airports, and simply bought the airplane their judgment dictated as best for their uses. The problem now is to find more persons who can be cultivated and developed up to the point of purchasing.

We have heard of numerous new and elaborate sales programs, but has the industry thought enough about market research? It is true that there have been numerous factual analyses of the aircraft market. Trade publications, national magazines of general scope, and advertising agencies have accomplished some comprehensive and worthwhile surveys. It is not believed, however, that these are being used to best advantage by sales managers in the aeronautic industry. Their thoughts apparently are confined largely to distributors' discounts, publicity-bringing flights, and colorful advertising.

Two classes of statistics are available to the aeronautic industry in analyzing its market: First, those dealing with aeronautics exclusively; and second, those dealing with general business and economic facts. The first class of data are being used, but, it is believed, not advantageously by the majority of sales managers. These are useful for purposes of determining the brief history of the market as well as its current condition. The second class of facts is useful in determining what action to take in order to obtain future business.

Sales managers are busy with multitudinous problems, and most of them shy away from statistical data. The surveys the sales manager has had directed to his attention by publications and advertising agencies have contained many interesting facts—but he cannot see how these will help sales volume. The data usually goes in the files for reference when the sales manager has time, but in most cases, he never finds time. It must be said for him that the surveys do not go in the waste basket although they might just as well for all the practical use that is made of them. Older industries recognize the need for scientific market analyses. They hire specialists for this work and find that it pays.

One fact stands out in surveying the field of market statistics: there are better data upon which to gauge the present and recent historical market for aircraft than there are for any other product. This may seem a broad statement but it is believed to be an absolute fact. What industry has facts so readily available to it as the following: names and addresses of purchasers; make and type of product purchased; year in which product was produced; length of time before distributors or dealers resell a specific product; and names and addresses of persons at present qualified to make direct use of and to maintain the product?

The aeronautics industry has these data readily available in the form of the quarterly (cumulative) and weekly (current) registration lists compiled and disseminated by the Washington Bureau of Aeronautical Chamber of Commerce from Aeronautics Branch records. It is apparent from the large demand for the service that the industry is using this valuable information. Its main use is believed to be for purposes of circularizing airplane owners, pilots and mechanics with sales propaganda. Other uses are being overlooked.

THE Aeronautical Chamber of Commerce is now obtaining from its members complete lists of distributors and dealers so that for the first time an accurate figure of planes owned by private users may be segregated from those used by other types of operators. Air mail contractors are known. So are the schools and clubs, and, if not, the name of the registrant identifies the operation for which the aircraft is used. By elimination we can arrive at the figure for private owners. This is an obviously important factor and to date, although many estimates have been made, no one has taken the initiative to uncover this figure from the mass of data in which it is contained.

Thanks to "Ray" Cooper and the "Detroit Aviation Directory," published by the Aircraft Bureau of that city, we have a list of distributors, dealers, and air service operators in Michigan. As a sample of what can be accomplished with the aircraft registrations for Michigan in the Aeronautics Branch-Aeronautical Chamber of Commerce compilation for Jan. 15, 1930, in conjunction with Mr. Cooper's directory, we find the following:

Of the 474 licensed and identified aircraft registered

in Michigan 224 or 47 per cent were privately owned; 71 or 15 per cent were in the hands of distributors and dealers; 55 or 12 per cent in the hands of manufacturers; 17 or about 4 per cent being used on scheduled air routes; 21 or about 4 per cent by non-aeronautical business organizations; and 61 or about 13 per cent by schools, clubs and other types of fixed base operators. The remaining 25 aircraft consisted of 21 gliders and 4 balloons which according to the state law must be given Federal identification numbers.

There are many other break downs which members of the industry can work out. For example, old war surplus aircraft can be segregated from others listed under "identified"; the year of production is given so that one can break down the registration by the relative age of the planes.

THESE ARE believed to be very enlightening figures. The percentage of private users is surprising; also the number of planes in the hands of distributors, dealers and manufacturers. That Michigan has more planes used by non-aviation organizations than by air transport operators is illuminating to say the least. It is difficult, of course, to separate aircraft as to those "on hand" for sale by dealers and distributors and those being used by those organizations in their own operations. We have used the method of considering the type, make and yearly model of plane; whether it is old, new, or of a make which the particular dealer or distributor is listed as representing. Persons experienced with commercial aviation can determine with reasonable accuracy, from names of registrants and equipment registered, what type of operation is being conducted.

The quarterly cumulative lists of aircraft registrations could also be used in determining planes unsold and in the hands of manufacturers, if the manufacturers would follow rigidly the policy of identifying aircraft when completed. There is no legal requirement in this connection. If the industry should agree on a policy of not withholding "identifications," there would not be this uncertainty as to its carryover or surplus.

We also have a list of distributors and dealers in Oregon obtained for this article by radio through the courtesy of James Bretherton, acting manager of the Portland Office of the Bureau of Foreign and Domestic Commerce. This shows that of the 113 planes, both licensed and identified, in Oregon on Jan. 15, 1930, 54 or 48 per cent were privately owned; 27 or 24 per cent in the hands of distributors and dealers; 4 or 4 per cent experimental licensed planes in the hands of manufacturers; 3 or 3 per cent being used on scheduled air routes; 3 or 3 per cent by non-aviation business organizations; and 20 or 18 per cent by schools, clubs and other fixed base operators. The remaining two aircraft were gliders which have identification numbers.

Here is a state, principally agricultural, which with Michigan, an industrial state, is a representative market. Compare the breakdown for Oregon with that of Michigan. We find a smaller proportion of industrial users, a slightly larger percentage of privately-owned planes and other valuable comparisons.

Using Oregon's weekly registrations as a test case on distributor and dealer turnover, the January 15 total registrations show 49 licensed aircraft and 64 identified. The January 25 weekly release shows one relicense (change in ownership) of an OX5 job of well-known make. As the Department of Commerce numbers of the planes do not change, regardless of changes in ownership, that number on the January 15 cumulative list can be referred to for the purpose of determining who sold the plane. It was not a firm mentioned in our radio from Portland as the state distributor or as a local dealer for that make of plane. The name of the new owner is not listed in the dealer and distributor compilation. As we cannot identify him as an operator for business, we can assume that he is a private user. Let us check his name on the pilot's lists. Sure enough, he is down as a student pilot on the weekly list of January 18, 1930. We know conclusively that another private owner has come into the field. We know who sold him the plane. If we wanted to take the trouble we could trace that plane back to the time it got into the hands of the last seller, but it is a 1927 model so we will not bother. The plane may have changed hands several times. If we desire we can trace it back as far as when the factory had it first identified. We could also find out how long it remained on the manufacturers hands before he let it out presumably as a bona fide sale.

Many facts can be worked out from these worthwhile lists. They are being improved. Since January 18 new plane licenses are indicated by asterisks. The January 18, issue, by the way, includes data taken into consideration on the January 15, cumulative list. We have been told by Paul Brattain head of the Washington Bureau of the Aeronautical Chamber of Commerce that the cumulative lists are brought up-to-date quarterly, ("Licensed Mechanics," "Licensed and Identified Aircraft" and "Licensed Pilots") being released on alternate months, the last issues being December 15, January 15, and February 15, respectively. The weekly lists containing current registrations of aircraft, pilots, mechanics are dated and released on Saturday of each week. Accordingly, additions and charges for aircraft on the list of "Aircraft, Pilots and Mechanics Licensed" during the week of January 18, are covered by the January 15th cumulative list.

INCIDENTALLY, the Aeronautical Chamber deserves a great amount of credit for making available to its industry the most complete and valuable data to be had by any group in any industry. The Aeronautics Branch (this can be said without braggadocio, as the Aeronautics Trade Division, although cooperating closely with that branch of the Commerce Department is not a part of it, this division being under the Bureau of Foreign and Domestic Commerce) deserves credit and a large amount of its broadminded attitude in allowing the Chamber to compile and disseminate the facts from its records. Formerly several publications compiled these data inpendently and some discrepancies occurred in their respective releases with resulting confusion. The Aeronautical Chamber of Commerce gets out the information quickly. It is available to anyone. Should the Aeronautics Branch endeaver to handle the job itself it would require a special appropriation and unavoidable delay in printing.

Another improvement in the service is that starting with the weekly list for the week ending February 8 the names of the immediate former owners of licensed or identified aircraft are included. This precludes the necessity of looking up the name in the cumulative list as was necessary in the aforementioned test case. There are several supplemental services in connection with these registration lists. A private statistical service starting with January this year breaks the aircraft figures down by makes of planes, by states, in a manner

similar to the same services "break down" of automobile registrations. As some manufacturers have different types of planes i.e., open biplanes and cabin monoplanes, this compilation, if further broken down by types, would be of greater value. The Aeronautical Chamber has released in mimeographed form a "break down" of licensed aircraft by types, by states, as of Jan. 15, 1930. Now what we need, and what the Chamber is going to make available, is one showing types of purchasers for the whole country as has been done here for Michigan and Oregon.

Some individual whose mind runs along statistical lines will devolve a simple system for compiling and breaking down these valuable data to give one who is selling aircraft everything he would like to have from them at his finger tips. The basic data is available. The resulting work should be simple and not too scientific or complicated.

Now as to the second class of statistics. The first as stated before deals solely with aviation. We have mentioned the most valuable. What can be done about selling more of the laymen and not wasting effort on those who are already sold? We turn again to dry old statistics for guidance and there are volumes of them. Fortunately someone has poured over these and consolidated in one volume some of the most pertinent figures for the market analyst no matter what line of merchandise he is interested in selling.

IT IS SOMEWHAT of an anomaly that practically no aeronautics sales managers or, in fact, few individuals in the industry have taken the trouble to survey the "Market Data Handbook of the United States." Upon its release from the Government Printing Office last fall, it was especially directed to the attention of the aviation industry by the Aeronautics Trade Division through the local offices of this Bureau. To our knowledge, not more than one or two books have been sold to this industry, which perhaps needs more merchandising study than any other.

The Department of Commerce is not in the business of selling books, and, in fact, it is unnecessary to buy one as it may be referred to at any of the 31 district offices of the Bureau located throughout the country. This work is believed to be of value in gauging the future aeronautic market; in determining where to place advertising; in the better allocation, as opposed to the heretofore haphazard allocation, of distributor and dealer territories; and in establishing sales quotas. Older and more important industries, from the standpoint of value of production, are taking advantage of the data contained in this Handbook, as demonstrated by the fact that it is now in its third edition, two of them of 3,000 copies each having been completely exhausted within two months of initial release. The author, Paul W. Stewart, of the Department of Commerce worked for two years, with a staff of assistants and with the cooperation of various national advertising agencies in preparing it. As a result he was recently awarded one of the Bok prizes for his contribution to American advertising for 1929.

With regard to the Handbook there are three general types of markets considered; the general consumer, the industrial and the farm—all very definitely fitting into the aeronautics picture, although the last mentioned has not been seriously considered by our industry. The 3,073 counties of the United States are used as units for purposes of market measurement. Four trading area maps are included as supplements to the Handbook, two of which present both the wholesale and retail angles of distribution. One map covering operating territories delineates 50 major trading areas which are subdivided in some instances into secondary areas making 187 for the entire country. The 50 major trading areas, which do not take state boundaries into consideration but rather economic divisions, may be used as distributor or factory branch territories and the smaller ones for subdistributors and dealers.

This largely statistical work contains the following data, by states with break down by counties, all of which have a direct application to the market for aeronautic products: Population (urban, rural and number of families); value of agricultural production; value of mining; bank deposits (with savings separate from total); postal receipts; number of individual income tax returns; passenger automobiles; audited circulation of 15 national magazines, and various classes of newspapers; and number of trade outlets, retail and wholesale.

THE FOREGOING applies to the consumer market, in other words the "private owner." We can imagine the aeronautic salesman or his boss asking, "what practical use can be made of this mass of data?" Briefly, they tell him where the people are in the country who have the means to purchase aircraft. The sales manager, if he already has a distributor in a territory which shows up well in light of these statistics, can tell the latter a lot about the territory that the representative does not know, and why more sales should be made. If there is no representative in the particular territory steps should be taken to obtain one.

A table in the book showing the production of the various fishing grounds in the country would ordinarily be passed over without thought. It should direct attention to a new market, i.e., aircraft for the transportation of fish inland. The industrial and farm markets are covered similarly, in so far as detail is concerned, to the manner outlined for the consumer trade. The Handbook also contains a bibliography on market research. Some of the publications listed contain specific guidance in determining sales quotas, some attempt to apply practically the theory of market analysis, and others are purely statistical.

There are of course other statistics of value in aircraft market analysis which because of limited space cannot be mentioned in this article. When the 1930 census is completed a break down of population between 16 and 45 years of age might indicate, with a deduction of perhaps 15 per cent for those not physically qualified to fly, the number of potential pilots to fly privately owned aircraft. One heretofore unpublished fact recently uncovered by the Aeronautics Trade Division may be taken as an indication that the industry, although criticised for overproducing and for hit or miss distribution methods, has something favorable to be said for it. According to the National Automobile Chamber of Commerce but 3,081 passenger automobiles valued at over $4,000 were produced in United States factories during 1929. In the same year 6,034 aircraft at an average valuation of well over $6,000 were produced. By scientific instead of haphazard sales methods, based upon thorough analysis of the market, the industry should reach out and develop the three classes of potential customer—individual, industrial—and, do not overlook, the agricultural.

THE *Parts Distributor* AND

By EDWIN G. THOMPSON
President, Thompson Aeronautical Corporation

THERE IS an old axiom which states: "A chain is no stronger than its weakest link." Since there is such a close integrity of purpose between the manufacturer, distributor and dealer, it may justly be said that a manufacturer is no stronger than his weakest distributor; and that the latter is no stronger than his weakest dealer. Thus, the success of each depends upon the success of all. Therefore, it behooves the manufacturer to make his distributor organization as strong as possible; and the distributor to exert every effort to keep his dealer set-up of the highest calibre.

Because of their common interest and notwithstanding the fact that the purpose of this article is to deal primarily with the aids distributors of aircraft engine and parts should give their dealers, it might be well to outline briefly here the help manufacturers of such products should give their distributors.

It is generally acknowledged that the manufacturer has a more profound knowledge of his product than any of his distributors. This is due to the fact that the latter may be acting in the same capacity for a number of various firms. Consequently, it is more important that the manufacturer bend every effort to see that his distributor and their salesmen possess as thorough knowledge of his product as possible.

The manufacturer should, in many cases, train his distributors' salesmen. If an engine builder, he should maintain a school, or be able to provide mechanics skilled in the methods of servicing his products, in order that his engines are properly protected by adequate service facilities. He should supervise or provide his distributors' advertising; and it is part of his duty to perform in a general way the more specific duties of the distributors.

Now we come to the functions of a distributor in regard to the aids he should give his dealers. It is difficult to differentiate between the importance of the numerous functions of a distributor, but perhaps his most essential duty is keeping his dealers informed of new developments in the products they are handling.

We believe that the need for keeping one's dealers cognizant of new developments and improvements is one of the distributor's most important functions because of the countless product changes and refinements that are being made from day to day by aero manufacturers.

Many aircraft engine manufacturers have found that, no matter how many "bugs" they are able to discover and eliminate through block-tests and test flights, there are always countless others which are not found until the engines have been placed in production and are giving actual service on air lines and planes. Also, because competition in the engine field is extremely keen at present, all manufacturers are constantly working to perfect their engines. Thus, it can be seen that an engine which is apparently in its ultimate form today may, a month from now, be lacking in some of the refinements contained in an engine of the same type, which came off the same assembly at a later date.

Edwin G. Thompson

JUST RECENTLY our company received notice from the home office of an engine builder, for whom we are distributor, stating that they had developed an improved part for the rocker-arm of one of their engines. This type of power plant has been in production and delivering daily service on many planes throughout the country for over a year. Yet the manufacturer requested that we have this change made on all engines of this particular type that come into our shops or those of our dealers for overhaul, in the future.

This is just one of many similar instances. In each case it is essential, of course, that we acquire an adequate supply of the new parts, infor mour dealers immediately of the improvement and see that they, too, stock up on these parts.

Very often the manufacturer may develop new tools to facilitate the servicing and overhauling of his engines.

HIS DEALERS

No matter how fine the quality of his product may be the progressive aircraft engine manufacturer should establish a parts and service organization so that his customers may be assured of maximum value for money expended. The keystones of such an organization are the distributors. They are responsible to the manufacturer for the activities of the dealers, and it is the dealer who actually contacts the man who originally placed his signature on the dotted line of the manufacturer's sales contract. ¶In the accompanying article Mr. Thompson discusses from an authoritative point of view, the responsibilities of the parts distributor and the various methods to be followed in building up a profitable dealer organization.

Or the distributor, in his own shops, may work out more efficient tools or methods for performing various jobs. Such knowledge and aids should be given to the dealers as promptly as possible.

Following next in importance among the aids a distributor should give his dealer are merchandising helps and suggestions. In the aviation industry, the outlet for such products as airplane engines and parts is not of sufficient volume to permit the distributor to function with inventories analogous to distributors for similar products in other industries. Consequently, the distributors' inventories are high, the sales are slow, and the turnover low. The distributor who turns his inventory over twice a year, assuming he maintains a sufficient stock to serve his territory, may be said to be doing an excellent business. However, to operate on a more economic basis and receive a return from his investment commensurable with that of other lines which he might handle, the distributor should be enabled to turn his stock over four or five times a year.

AT PRESENT discounts on aeronautical supplies and engine parts are too small. These rates are set up by the manufacturer in most instances. The reason for the small rates revolves around the old economic principle of supply and demand.

The solution to the problem of small turnover and low discount rate is, of course, to create a larger sales volume through a well-organized distributor and dealer organization. However, during this period through which we are passing, with discount rates lower than those in other industries, the responsibility of correcting this condition lies with the manufacturer.

Notwithstanding the above mentioned fact it is up to the distributor to do what he can to build sales and endeavor to show the manufacurer that the condition should be remedied. It is necessary, too, that he give his dealers all the assistance they require in selling their service and parts.

The distributor's salesmen should work with his dealers' salesmen. The former should accompany the latter on various calls whenever the occasion warrants. Through

The sales counter of a parts distributor's depot. Note case display of parts

this system the distributor may observe and correct the sales methods of his dealer. By this procedure, too, he can help select the real prospect and sell them perhaps more thoroughly than would otherwise be possible.

THE SALES PROPOSITION is extremely complex because of the scattered and limited registration of prospective cutomers. This condition will hold true until the American public, as a whole, become air-minded to the extent that they adapt the airplane to their business or personal use. In the meantime it is quite important that a sales and educational campaign be carried on at the same time. And sales and educational programs can be best carried out by the personal contact work of salesmen which in turn is bolstered up by advertising aids.

We have found in our own company that a properly conducted direct mail campaign is the best type of advertising for selling service and parts, although it is tied in with trade journal advertising. Our partiality for direct mail advertising is due to the fact that, as in the case with most distributors and dealers, the territory we serve is limited. Because of this there are few if any publications which offer a complete coverage of our market without a great waste. Therefore, the logical type of advertising for a dealer is direct mail. And, inasmuch as few dealers are equipped to prepare such literature, it is the duty of the distributor to assume or supervise this work.

As has been mentioned before, we tie our direct mail advertising in with advertisements in several of the better trade magazines. This latter type of advertising, while essential in our case, is undoubtedly too expensive for the smaller dealer. However, in instances where the dealer is going after a large transient business, he must use such mediums. In all instances the distributor, when not assisting in the preparation of the copy, should have the right and, in fact, make it a point to supervise all of the dealer's advertising. This is merely in line with the general procedure followed by most manufacturers in dictating the type and tone of advertising which the distributor should employ.

Now we come to the duty of the distributor in the matter of fulfilling his functions as a source of supply for his dealers. Theoretically, the distributor occupies the same position in relation to a manufacturer as a factory branch and, as such, he should be properly located geographically to best serve his dealers. He should be situated as near the center of his territory as possible, or should have a complete inventory of stock at such a point. Only in this way can he give his dealers the prompt and speedy delivery they often demand.

Also, in appointing his dealers, the distributor should endeavor to have them located at the most strategic points geographically in order that they, too, will be in the best possible position to serve the widely scattered owners and operators. In other words, the dealers, whose duty it is to function as a branch of the distributor's services, should make these facilities available to the individual owner and operator no matter where he may be.

The majority of owners of airplanes are scattered in small home ports over a wide territory. Consequently, it is necessary for the distributor to have a well planned, properly laid out dealers' organization, to render adequate service.

THIS BRINGS US to the question of stock. We have just stated that a distributor should be centrally located in his territory to expedite deliveries. For the same reason he should carry on hand at all times a full complement of parts and supplies to supplement the skeleton stock the dealers are required to maintain.

It is not only a question of selling the dealer his initial order of stock, but it is equally important that he be given help in keeping his stock properly inventoried in order that he may in turn render proper service in his territory. In many instances it is advisable for the distributor to assist his dealer in setting up a cardex, or some other system, whereby they can keep an accurate check on their stock.

It is essential, too, that the distributor give every available aid in keeping his dealers' stock of parts for obsolete, or near-obsolete engines as low as possible, so that they will not find themselves with large sums tied up in unmovable parts, on their hands. To this end, the distributor must be able to give technical advice and assistance. The problem also goes back to the need for keeping dealers informed of all new developments and refinements which we previously mentioned.

From the points we have outlined, it is clearly apparent that a distributor must be a specialist and a jack-of-all-trades at the same time. While not operating directly with the consumer, but serving more directly through his dealer organization, he must have a broad knowledge of the dealers' problems from every angle. He must have an authoritative knowledge of engine overhaul, which will enable him to render expert technical advice whenever called upon. He must be in a position to give merchandising helps and suggestions. He should be able to assist in formulating efficient inventory and stock accounting systems. And he should be capable and ready at all times to supplement his dealers' service and render any aid necessary.

A view of the parts stock room in a service hangar

MERCHANDISING BEGINS IN THE Drafting Room

By JOHN F. HARDECKER

MERCHANDISING and servicing appear at first consideration to be functions far removed from the drafting room, yet there is a certain tangible relationship, and many a real merchandising problem is unwittingly born on the drafting board. In fact, the cause of a difficulty of this nature is often so far removed from the source, that not even a suspicion of guilt filters back to the real inception of the trouble.

To properly conceive of this relationship, it is necessary to appreciate that what a plane or accessory manufacturer is selling is not a demonstration model on the show floor or the home airport—but transportation performance anywhere in the world. It is not what the product will do once or twice or even a hundred times under ideal conditions when new—but how it will stand the test of time and abuse under adverse conditions.

The designer or draftsman once and for all must forget about what he would do with his product—with all his pride of creation and intimate expert knowledge of detail, and consider it in the light of how anyone—anywhere—might operate and service it. It isn't enough to feel that to do a certain thing or not do it isn't common sense—its his job to make the doing of the right thing easy, and the wrong thing impossible.

This implies immediately a more intimate study of materials and tolerances. Ease of machining in the shop is certainly a point in favor of any given material, but when that advantage carries with it a consequent wear on the softer material in operation that hastens replacement, then it is no longer an advantage from the true merchandising angle. Weight saving is of primary consideration, but if light alloy fuel lines will not stand up as well as the copper lines in actual power plant operation, then the weight saving must be logically foregone. Standard bolts are a distinct advantage, but if they introduce play in a hinge point which breeds excessive wear, then special close tolerance bolts are a true merchandising necessity. Ball bearing control pulleys obviously cost more, but if they introduce operational ease and greater life, the designer should specify them regardless.

When an organization buys in sufficiently large quantities, and many aviation activities are rapidly approaching that position, special materials or special variations are

At first glance the title of this article might appear to be a bit far-fetched. Yet, as Mr. Hardecker points out . . . "there is a tangible relationship, and many a real merchandising problem is unwittingly born on the drafting board." ¶In support of his opinions Mr. Hardecker writes of several merchandising "errors" that can be traced to the drafting board. Individually, they are of no consequence whatsoever, but collectively they can very easily prove to be a most serious hindrance.

readily obtainable. Many times such specifications possess distinct technical advantages, and many times also the advantages are purely traditional. It is well to thoroughly examine all such special material specifications, for while they may possess what at first appears to be highly desirable selling points, the operator who is down in an isolated section of the country cares nothing for such refinements. He'll replace with whatever "looks like" the material in question from the nearest commercial source. And if he can't—well, there goes a black mark against that manufacturer.

A great deal can be gained by studying the commercial practice of the industry in which the material or part originates. It is easy to obtain special gages of metals, or even for ordinary commercial gages to fall within the tolerances of the special specified gages, but why complicate the replacement problem unnecessarily? Machined products may be bought to almost any details, but why introduce special parts, if ordinary commercial parts will do? These seem obvious points, but it is surprising how often their common sense is violated, for aviation deals with many materials and parts from many industries.

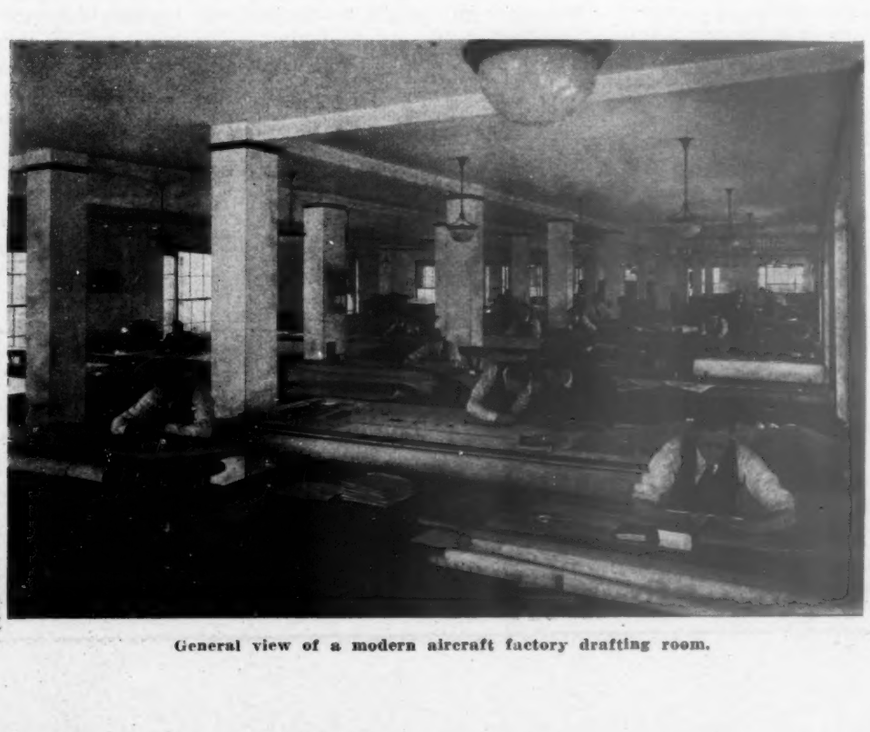
To call for current standard parts wherever applicable is such an obvious advantage in merchandising and selling, that it seems almost insulting to mention it. At least the advantages are too obvious to bear repetition. Yet, there is still a prominent airplane manufacturer who buys his bolts and nuts to the old Army standard part numbers, although AN bolts and nuts have been available for over five years. Then there persisted for a long time the airplane manufacturers who used special terminal connections on their streamline wires, so that replacements could not be made with standard AN terminals, and special ones had to be purchased or manufactured. Special parts founded on sound engineering judgment are occasionally necessary in place of more obvious standardized parts, but in the vast majority of cases they are founded on some special prejudice or inhibition of the engineer. The real kick-back occurs when the harassed operator is forced to unwittingly cater to what he realizes are idiosyncrasies of the particular engineer or draftsman, and real merchandising and selling effort is nullified thereby.

THE MATTER of part numbering drawings appears such a simple one, that seldom are the dangers to sound merchandising and servicing policies that lurk therein even suspected. Part numbers in the abstract are cheap, being really free for the asking of the record clerk, and so are often little respected in the drafting room. There is for example, the engine manufacturing organization which in furnishing complete detail drawings for each model, completely draws each separate item and assigns a new part number, so that in the mystery of various model assemblies, the same little inoffensive commercial cotter pin may be camouflaged under five different part numbers. Think of the attitude of the poor stockkeeper who is always making such enlightening discoveries, and wondering whether he can really trust his own observations. Consider his reactions when an excited service man enters his storeroom and pulls out the required part from a bin bearing a totally different part number.

Then there is the matter of changes on drawings and their effect on part numbers. Some manufacturers change part numbers rather generously—the most insignificant change breeds a new part number for the piece in question; others never change a part number, even though all interchangeability is lost or the change is mandatory due to actual failures in the original part. Sound servicing policy would appear to indicate that when changes are minor and interchangeability is unaffected, that part numbers should remain unchanged for easy identification and utilization of replacement parts on hand; where the change is mandatory a new part number will save endless confusion.

Ease of accessibility for service and repair incorporated into the design in the drafting room, is reputation insurance for the manufacturer. After all, repeat orders are the most satisfactory and gratifying source of profit in any business, and making it easy to keep your product in good order and operation, is self protection and self help. Too often a part requiring frequent inspection is made inaccessible, or lubrication points are so unhandy and well hidden, that they encourage neglect.

The foregoing are not points which are brought forth as criticisms of those charged with engineering policies. Obviously, cited handicaps would find little encouragement from major executives, who have the merchandising and servicing problem very much at heart. They are rather detail points, often decided by detail draftsman or minor engineers, which never reach executive attention in the light of their present presentation. Individually, the harm of single instances may well be evaluated to zero, but collectively, they total a serious and often undiscovered obstacle to successful merchandising.



General view of a modern aircraft factory drafting room.

SELLING *Air Passenger* TRANSPORTATION

A Review of Air Transport's Growth and What It Will Offer the Traveling Public Tomorrow

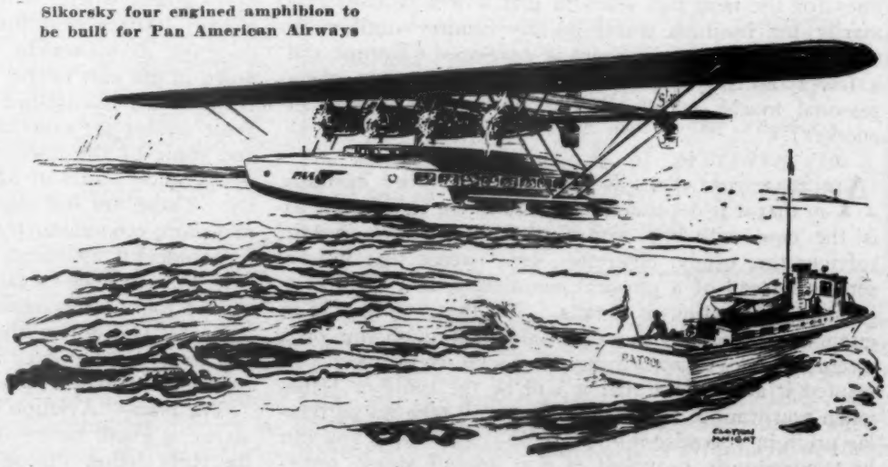
By J. M. EATON
General Traffic Manager, Pan American Airways, Inc.

THAT there is interest in the development of aviation cannot be questioned. The spread of interest covers the curious, the younger boys and girls, from six up, the sensation seeker, the commercial traveler, the banker, the investor, skilled labor, the college man anxious for opportunity, the post office, the public in general and the traveling public who uses transportation as a means to an end, anxious to reach destination with the least delay. The seasoned business man or woman realizes that any new industry must go through its "growing pains" during which time there will be periods vibrating between uncertainty and optimism, but sooner or later they are going to expect maturity and with it a steadying down to dependable behavior. A business is like a child—attractive, interesting, good, bad, wild, sensible, during which time people humor and make allowances but expect dependable behavior as maturity approaches, otherwise the promising child is thrown out as no good.

Aviation is no longer a child or a boy, but has reached its first stage of maturity. It was conceived back in 1185 A.D. when a subject of King Saladin invented a winged contraption with which he pretended to master the laws of gravity. It was born in about 1500 when Leonardo da Vinci, that great artist and sculptor, architect and engineer as well as scientist, through thought and study of aerodynamics, advanced theories which convinced him of the feasibility to elevate and keep in the air a body heavier than the atmosphere. It was an infant nursed by Montgolfier Brothers, de Rosier, Professor Charles, Carnillot, Le Bris, Lilienthal, Professor Langley, Dumont. The child was made to take a step in 1903 by Wright Brothers; and since that time has crept, taken more steps, walked, sprinted, and qualified on the track team. Contributions to advancement were made in rapid succession by men now famous in aviation up to the point where a diploma was awarded when Col. Charles A. Lindbergh set the world on fire in May 1927.

We now come face to face with the man—"Aviation"—who must select a vocation and determine what methods he will follow to make it a success. Based on the knowledge which he has accumulated during the great number of years since his conception and the wonderful

Sikorsky four engined amphibion to be built for Pan American Airways



opportunity of seeing whole hemispheres discovered, sailing vessels built, steam, electricity and gasoline motors developed, he needs no one to remind him that in order to be successful he must prove his worth by merit and not depend on that so-called "nanny goat appeal," which is a musical comedy expression meaning, an attraction based on a quick passing fancy prompted by sympathy or a shallow romantic appeal toward an individual effort satisfying a temporary desire. He knows that merit is based on dependability, regularity, comfort, attractiveness, safety, economic value and financial responsibility.

He has chosen transportation as his vocation and has adapted merit as the keynote of his policy in handling passengers, mail and express.

Most of us know what the tramp steamer is, or perhaps a better example, what the jitneys are, or were. However, only few realized what the jitneys were when they first appeared on our streets. It took but a few sad months to show that they were not a dependable method of transportation and merely a lot of individually owned automobiles put into operation under a policy which was based on a romantic appeal and was unsound. Aviation started off during its immature period more as the jitney and relied on the sensational thrill giving appeal which was quick passing; then asked for sympathy based on a romantic appeal of certain individual effort with the result that a premature situation was created. It must now apply the following formula to itself:

1. Is there a need for fast transportation?
2. Will air transportation function with or surplant other forms of transportation?
3. Is it best adapted for short haul or long haul?
4. Is it able to stand intensive competition from other lines of transportation, or will it best flourish where other transportation is not highly developed?
5. Will it develop new travel or will it simply divert business from other lines?
6. What is it adapted for—amusement, business, or both?

The answer is, there is need for fast transportation; that the air offers the best medium; that best results can be obtained over the longer distances (at least for the present where airports are located so far from the center of population and where short distances are served with fast established ground transportation); that the greater percentage of revenue will be diverted from other lines for the next five years in that it will be used primarily for business travel in this country until more commodious flying equipment is developed (Europe and a few spots in this country being the exception where seasonal tourist travel takes it up for one reason or another).

AIR TRANSPORTATION is just like any other business in that it is dependent on its sales for its revenue as is the case with the manufacturer of radio, electric refrigerator, candy, cigarettes, etc., except that it is a service instead of a physical commodity, and requires a greater combination of details. The thing to be sold is intangible, something you can't take home with you, only a remembrance of something you found useful when you wanted it and expect that it will be the same or better when you want it again, something you take no particular pride in (because it's not yours), something you can be tremendously provoked at if it doesn't please, something that is dependent on reputation and good will for its existence—in other words, it's a frame of mind; psychology has a big part to play in the success of ground transportation and is going to play even a bigger part in the selling of air travel. The company, or companies, that allow the more mechanical phases of the aerial transportation business to go beyond their function of economic safe operation and fail to build their policy on the vital fact of a scientific knowledge of human psychology may eke out an existence but will never be a success. In other words, the sales start not with the clerk at a ticket window, or behind a counter, or the salesman who may call at your office or the sales and advertising plan, but back into the selection and length of routes, the hour and frequency of schedules, the size and choice of equipment, the arrangements, the comfort and the appearance of the interior, the location and the architecture of ground facilities; the co-ordinating of and agreements with other forms of transportation, and the opportunity to be constructively critical of the manner in which operations are conducted after the system is in operation.

Travelers are interested in comfortable, attractive, safe, dependable handling at a price that is within their reach, not beyond what they can spend. But it has been proven that they will stretch their limit if they are pleased and they are perfectly willing that a company which is giving a service be allowed to make money; but have a Twentieth Century mind which expects multiple production, low costs and maximum value.

THIS PUTS air transportation face to face with the necessity for bigger planes—planes of fifty to a hundred or more passengers—planes with not only seats to accommodate its passengers but additional space attractively laid out for lounging, smoking, refreshments and observation. Is there any reason to believe, provided comfort, speed, safety and regularity are available at a reasonable rate, why fifty or a hundred passengers will not leave by air—Boston or New York for Chicago —or Los Angeles or San Francisco for New York—or United States for Central and South America—or even a short haul like New York to Boston—when we have steamships and railroad trains carrying two hundred to two thousand passengers daily? With these larger units, costs per passenger could be so reduced that rates could be dropped to the scale of ground or water transportation and the operating companies would be in a position to enjoy profits.

At the present time, equipment has reached a point of development where, with proper maintenance, it can be trusted 100 per cent for the purposes for which it was designed, as proven by the millions of scheduled miles flown in the past twelve months, over established routes. It has been handicapped by small capacity planes but great strides are now being made in commercial planes and some of the lines will, within the next year, have in operation planes of 32, 36, 41 and 49 passenger capacity. These are but the forerunners of the still bigger and more economical planes.

Wonderful assistance has been given by the United States Post Office Department to the development of the use of the air throughout the United States and Latin America, and during the last two years passenger travel has been developed to a point that more than 165,000 passengers traveled by air in the Western Hemisphere.

The man—"Aviation"—has his feet on the ground, his stance is good, his eye is on the ball and his swing has the right follow through.

DEVELOPING THE *Foreign Aircraft Market*

By LEIGHTON W. ROGERS
Chief, Aeronautics Trade Division
Bureau of Foreign and Domestic Commerce

To some manufacturers the development of a foreign market would mean worth while profits and a business life saver during periods of domestic sales slumps. To other manufacturers the development of a market across the seas would be but a waste of money and energy. As Mr. Rogers points out in this most interesting and informative article, export business should be regarded as more than just a side line to be taken up or dropped at will. It is a good source of business revenue that requires just as much executive skill as the domestic business. ¶We sincerely advise every manufacturer to give serious consideration to what Mr. Rogers writes here about the requirements and methods of procedure in conducting a successful aeronautic export business.

EXPORTS of aircraft, engines, parts and accessories from producing countries have increased rapidly during recent years, although international shipments of these products are small in comparison with those of other items of transportation equipment. Figures just available for 1929 show an almost threefold increase in aeronautic exports over the year preceding. Because of the diversified uses of aircraft in the United States, it would appear that this country is peculiarly fitted to supply the world market.

This does not mean that all American aircraft manufacturing companies should try the export market. These are practices built up by experience which some companies would not be in a position to adopt. Do not "dabble" with export trade. Do no rush into it one year because business is bad at home and ease off or abandon it when domestic business picks up. Unless you have the time to give it executive attention, the money to enable you to work on a three to five year program, and an approved product it is far better not to enter export trade at all. This does not mean that only the large companies or groups strong enought to have separate export companies can be successful, as experience in the automobile field has shown that some of the most successful American cars in export trade are not especially important in the domestic field, nor are the companies manufacturing them. The companies have simply concentrated on building up export trade over a period of years.

Many export departments and companies have failed in other trades because too often export matters have been turned over to clerical or minor executive attention. This is folly. The problems of exporting are special and they require the best possible executive ability. One of the most successful truck exporters in the United States attributes the success in exports of the company of which he is president to the fact that his product is the best that can be made for the money, that he personally gives much of his time to the export phase of the business, and that the factory has explicit instructions to give export orders preference. Over a period of five years, this company has built up an export trade which forms a solid, comparatively non-fluctuating undercurrent to its business which carries it throught whatever

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lean years occur in its large domestic market. This is the type of executive practice which aircraft exporters can follow with profit.

The Department of Commerce is prepared to render assistance to companies deserving to develop export trade in approved products along sound lines.

ONE OF the major functions of the Aeronautics Trade Division is to point the way to American manufacturers of airplanes and kindred products toward successful exporting. The district and cooperative offices of the Bureau of Foreign and Domestic Commerce of the Department of Commerce are placed at important centers so that exporters and potential exporters may have questions answered which might arise in any phase of their export trade. Files are maintained in the offices enabling their staffs to anticipate some of these questions and render services automatically available to aeronautic firms listed on the Bureau's exporters' index. The names of prospective importers and dealers of aircraft engines, parts and accessories, memoranda of opportunities for the sale of such equipment, and data on market conditions are made available only to bona fide United States firms (with at least 51 per cent of capital controlled by citizens of the United States). The exporters' index enrollment, entitling manufacturers or exporting firms to this complete service, may be arranged upon application to the appropriate district or cooperative office.

The Aeronautics Trade Division has received a very considerable degree of cooperation from the 63 foreign offices of the Bureau, located in strategic points throughout the world for the specific purpose of aiding American manufacturers to market their products, as well as from Consulates of the Department of State. It is the function of the Division to coordinate the aeronautics trade promotion work of the various foreign and domestic offices and to give advice to the uninitiated aeronautic firm. Also basic and current market data are obtained and disseminated which will enable those interested, whether or not experienced in export, to have a complete and accurate picture of the elements, both favorable to and militating against, the importation of United States aeronautic equipment.

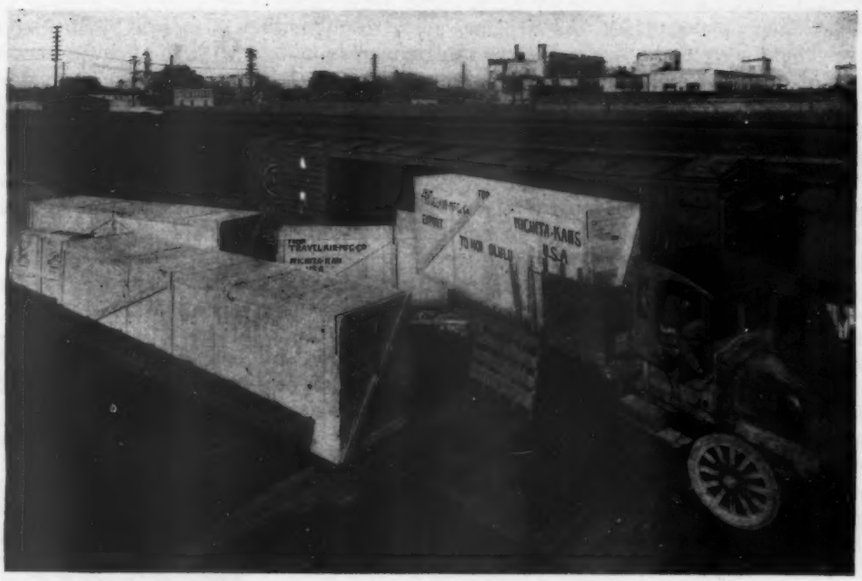
The district and cooperative offices will be pleased to answer all questions possible and pass on specific inquiries to the Aeronautics Trade Division, which, for any reason, cannot be replied to locally. For purposes of expediting the service, it is suggested that the appropriate domestic offices be consulted rather than the Division direct.

Some airplane and aeronautic product manufacturers have been found to be wary of foreign business, having obtained the impression that exporting is fraught with mystery. They think of import duties, translations into and from foreign languages, crating for ocean shipment, consular formalities, methods of payment, etc., as insurmountable barriers to successful exporting. These problems can be quite simple when the industry knows where it may go for information and advice. In this connection the Division is not nor does it claim to be an infallible source for everything that the potential exporters may require. It can, however, with the facilities at its disposal, render a unique service, sometimes if only as a clearing house of information available from outside sources. It follows religiously the policy of not duplicating any services rendered by others. No matter how foolish a question may be in the mind of a member of the aeronautics industry, the Division should like to be called on and will return a courteous and pertinent reply.

It has been directed to the attention of the Division by foreign individuals and firms of unquestionable financial standing and sincerity that their inquiries, some even by cable, for specifications, performance data and prices have never been answered at all, or replied to either in-

Crated planes on the deck of a ship bound for foreign ports.

adequately or too late for consideration. Nothing creates a more unfavorable impression in the minds of prospects. It is realized that some manufacturers were for a time unable to meet domestic demand and that, during certain periods, they have been tooling up for new models. It is suggested that regardless of whether a sale can be concluded at the time, courteous answers be made to any inquiries from abroad. Careful and expeditious replies to inquiries from foreign countries will reap dividends in the future when the airplane manufacturer is desirous of obtaining foreign business.



Travel Air products being shipped to Honolulu, Hawaii.

IT IS UNNECESSARY to have at hand rates of import or customs duties except as indications of market potentialities, for these duties are absorbed by the customer and should under no circumstances be included in the quotetd prices. Aeronautical products are so new as items in international trade that some governments have not yet established rates for them, while others assume the attitude that the benefits accruing from airplane operation warrant the encouragement of airplane engine and parts imports to the extent of allowing free entry. It should be considered that rates of duty are subject to change and any compilation covering a great number of countries would soon be out of date and its use, therefore, of negative value.

In this connection certain countries assess duties, particularly on parts, on the basis of the components, each item taking a different rate. As there are so many component parts of an airplane and engine, and each would be classified differently in certain tariff schedules, it would be impracticable, if not impossible, to furnish all rates for all countries. It should be considered that if a market exists in a foreign country for United States' aircraft, the tariff will have small bearing upon the successful conclusion of the sale. Practically no countries, with the exception of certain British colonies in favor of products made within the British Empire grant lower duty rates to European aeronautic manufacturers than to American.

The Division of Foreign Tariffs, through the domestic offices, will be glad to answer inquiries as to the custom duty rates assessed on aeronautic equipment. Here again it is pointed out as being advantageous to contact with the local office as it may have the required data immediately available.

Translation bureaus, foreign language schools, and some foreign students in universities are capable of making translations. Care should be exercised in the selection of capable translators, particularly for purposes of translating English into a foreign language. The local Department representatives can often advise where the services of satisfactory translators may be obtained. English is becoming, to a certain extent, the international commercial language and most foreign firms and individuals with which aeronautic exporters deal, would have a reading knowledge of that language. It is sometimes politic, however, to make reply to inquiries in the language of the inquirer, as it is certainly necessary to have advertising and sales literature prepared in foreign languages. Of utmost importance in sending advertising literature is that of having translations made properly so they will not be ridiculous in the eyes of foreign readers.

Quotations are in practically all cases required on what is known as a C.I.F. basis (C.I.F. meaning all costs, insurances and freight to the port or point of entry most convenient to or specified by the customer). Included in these quotations should be the F.O.B. price, crating costs, delivery to steamer, or point of entry if overland, and if the shipment is destined for a point overseas, the ocean freight and marine insurance. It is essential that the manufacturer or exporter obtain the necessary data and submit the form of quotation requested.

Properly speaking, there are no factors other than those named included in C.I.F. price, but in some countries where the consular fees are assessed before shipment the cost of consular documentation should be included. It is not difficult to obtain information as to the various rates entering into a C.I.F. quotation.

THE LOCAL railway freight office can furnish rail rates, and if steamship freight offices and marine insurance agents are not located in the vicinity, the local district or cooperative office of this Bureau can advise where to get the information needed, or can obtain it. Considerable business has been lost by airplane and other manufacturers who have quoted on a F.O.B. basis when C.I.F. quotations were specified. The reason for this is that the inquirer cannot, without considerable trouble and expense, obtain the rail rates, marine insurance and ocean freight rates, whereas this information is more readily available at the source of the shipment.

Crating is an item entering into a C.I.F. quotation and it is important to figure accurately the cost of material and labor involved. It has been directed to our attention that a satisfactory crate was made for a single engine cabin plane of 220 hp. at a cost of $350, and an export crate for a two-place open cockpit monoplane of

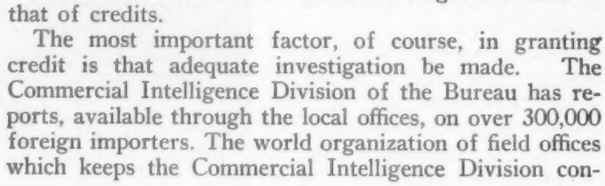
60 hp. for as low as $150. As airplanes are of comparatively light weight the ocean freight rate is usually calculated on a cubical rather than weight basis. Because of this there is no reason why crates should not be made strong. It is advisable to cover the airplane and engine with tar paper to prevent damage from salt water. The Packing and Materials Handling Section, of the Transportation Division, has prepared some specifications of airplane crates used for export shipments and these may be obtained through the local office.

The local offices of this Bureau are in a position to advise where the certificates of origin and other consular forms necessary may be obtained and can further advise where to go for aid in their execution. Some banks and most freight forwarders with branch offices in important centers are equipped to handle the actual paper work on foreign shipments, which in some cases, is quite involved. Charges for this service, included with those for the main services of freight forwarders and banks with foreign departments, are very reasonable. When a consular invoice is required and a consulate of the country involved is not located in the vicinity, the forwarder and banking connection can sometimes arrange to have the consular papers executed and viséed at the seaboard. The local office can advise when firms and individuals performing this function are located, as it can in regard to officially published sources of detailed information on documentation in the event that the manufacturer or shipper desires to handle the paper work within his organization. The offices can also advise where consulates are located.

INSURANCE for ocean shipment is underwritten by firms specializing in this business. A list of these firms may be obtained from the local office. At present the form of coverage for airplanes follows that for automobiles and is generally on the basis of so many cents for each $100 of value, depending on the destination, and when the crates are stowed under deck, includes coverage for breakage, theft and pilferage. The rate on planes stowed above deck is considerably higher and the form of coverage is not as liberal as the under deck policy. The cost of marine insurance is one of the charges to be included in figuring a C.I.F. quotation and is in all cases assumed by the shipper.

Distributor's agreement, in some instances, cover the subject of financial arrangements and credit, and specify cash before shipment, which, in the case of a foreign sale, may mean an irrevocable letter of credit which has been opened by the foreign buyer with some American bank. The bank should confirm to the exporter the fact that such a letter of credit is available and under what terms and for what amount the letter of credit is opened. Then when shipment has been made the bank will pay the amount specified by the invoice, if not exceeding the credit that has been opened, against presentation of the ocean Bill of Lading, the consular invoices and any other documents that may be necessary. This method of payment before the shipment leaves the country, of course, is the ideal one but cannot be adhered to rigidly if the volume of export business is to be appreciable. The practice of extending credit to foreign buyers may be as thoroughly established as it is in the case of domestic buyers. In this connection, it should be considered that the automotive industry insofar as the manufacturer is concerned has, since its inception, insisted upon cash before shipment, concerns have been organized to handle credits on foreign shipments and unquestionably there will soon be finance houses who will take care of credits in the aeronautic export field. It is recommended that the inexperienced exporter always consult his banking connection about methods of transferring funds and on that of credits.

The most important factor, of course, in granting credit is that adequate investigation be made. The Commercial Intelligence Division of the Bureau has reports, available through the local offices, on over 300,000 foreign importers. The world organization of field offices which keeps the Commercial Intelligence Division constantly supplied with up-to-date information on foreign firms can also make special and immediate investigation in case of need. In addition, banks, insurance agencies, foreign credit associations and the credit agencies are in a position to supplement the Government reports or give the prospective seller the benefit of the ledger experiences of others.



Stinson planes en route to China for use in the mail service of that country

Variations in laws of different countries make it difficult to generalize in regard to the subject of distributors' and dealers' agreements. The Commercial Laws Division of this Bureau, through the local offices, is in a position to advise on this subject although it is not the function of the Division to act as an attorney. Lists of attorneys in this country and abroad competent to draw up suitable agreements may be obtained upon application to the appropriate Bureau office.

IT IS of great importance to see to it that, when possible, advertising matter goes into a foreign country without the necessity for expense on the part of the consignee. In all countries this cannot be accomplished nor is it always possible to prepay duties which are sometimes assessed on advertising literature. There are certain marking requirements which should be observed as well as methods of shipment applicable for certain countries in order to insure freedom from duty or the lowest possible import duty rate. To meet the need for information on this important but seemingly inconsequential point the Division of Foreign Tariffs has prepared Trade Promotion Series No. 76, "Shipment of Samples and Advertising Matter Abroad." This publication also serves as a complete guide to the use of parcel post in foreign trade.

Probably the first step toward getting a product be-

fore the prospective consumer is to mail descriptive literature including specifications and performance data to a selected list of firms and individuals logically on the market for airplanes for resale or for their own use. The Aeronautics Trade Division has disseminated lists for this purpose which will be revised when the occasion warrants. American consuls and representatives of the Department of Commerce abroad should each be supplied with a few sets of literature. House organs such as published by certain aeronautic manufacturers can also be mailed abroad, although unless translated into Spanish would not be of much value in the Spanish-speaking countries. Other foreigners on the market for airplanes, particularly those in Europe would be able to read English or if not able to, and if sufficiently interested, could have translations made without much difficulty. There is one exception to this general rule and that is in the case of Brazil, where Portuguese is spoken. It would hardly be worth while to translate a considerable number of catalogs and other literature for this market. Some manufacturers, after a Brazilian distributor is appointed, might let him make the translations, the former absorbing all or a part of the expense of reprinting in Portuguese. This procedure has been followed in other lines of business and there is no reason why it would not work out advantageously for the exporter of aeronautic products.

Sales literature consisting of brochures, catalogs, tables of performance data and specifications as prepared for the domestic market are in most cases entirely suitable for foreign consumption as the appeal of aviation is universal and the same factors which would be considered favorably in this country would appeal abroad. This applies also to advertising copy.

ANOTHER WAY of reaching the foreign market is by advertising in the foreign aeronautical press. The Specialties Division of the Bureau, through the local offices, can advise where such journals are published, their reader influence, circulation and rates. Advertising agencies handling the placing of copy in foreign periodicals are in a position to supplement the information available from the Specialties Division and can advise whether or not advertising in specific foreign mediums would be warranted. Because of the limited market for American aircraft in Europe it would hardly be worth while to advertise extensively in European periodicals, while in South America and the Antipodes the few aeronautic journals may be considered good mediums. Some of the United States publications catering to foreign importers and dealers in automotive products and general merchandise lines are worthy of consideration.

It is only by actual demonstration in the field that some markets can be opened for airplanes. Sending one or two airplanes to South America, for example, would be costly and the immediate results may not appear to justify the expense. It is believed, however, that if any appreciable foreign business is to be obtained this somewhat expensive pioneering will be necessary.

The points in the West Indies and Central America presenting potentialities for aircraft sales could be covered en route to South America proper. Expert pilots, of course, should be chosen to fly these demonstration airplanes and if the pilot is not an experienced business man, with a speaking knowledge of Spanish and Portuguese and conversant with the Latin temperament, he should be accompanied by a man qualified in this respect. A man with such abilities could contract with distributors and perhaps aid in the promotion of intranational airlines for which there exists an apparent need. It has been estimated that it would cost from $5,000 to $15,000, depending on the type of airplane, to send a demonstration plane and personnel to South America, providing that the plane was sold there. The summaries of market conditions in each country will make brief mention of airports available for use by demonstrators, and on which details may be obtained from the Foreign Information Section of the Aeronautics Trade Division.

It is possible that manufacturers of well-known types of aircraft could obtain suitable distributors without sending a demonstration plane, by sending an experienced traveling representative, of the kind that has social entree into the most influential circles of the countries to be covered. This type of man would know of the publications of the Bureau of Foreign and Domestic Commerce which would be of value to him, such as the "Commercial Traveler's Guide to Latin America" (Miscellaneous Series No. 89) giving information as to surface transportation mediums, hotels, customs, etc., of all the Latin American countries.

IT HAS BEEN estimated that it would cost a minimum of $5,000 to send a $5,000-a-year man on a four months' trip to all of the important Latin American countries. This man could be supplied with operating cost data, models of airplanes, and do a great deal of preliminary work of value. His greatest task would be to make connections for the manufacturer with representatives in a position to negotiate sales after his departure from the territory. Parenthetically, it may be said that a man capable of this sort of work would command more than $5,000 a year. Commissions on business realized as the result of his work would naturally enhance his incentive as well as his income, in addition to the $5,000 figure. Such men in Europe or the Far East could make their headquarters at central points such as Paris or Shanghai and journey to other localities upon advice from the factory or other sources that potentialities exist elsewhere in the territory for airplane sales.

Few organized distributors of airplanes are in existence in foreign countries, such as those within the United States, which have in the main graduated from being "barnstormers" and fixed base operators, with war surplus equipment, to commercial airplane distributors and dealers. In foreign countries commercial pilots, with the exception of those employed in established airlines, are scarce and there are practically none of the so-called "fixed base operators." Accordingly, it will be necessary for airplane manufacturers to seek outlets other than the type which has pioneered the distribution of airplanes in the United States. Here other types of airplane outlets are being considered such as automobile dealers, department stores, etc. The foreign automotive distributor and dealer appears to be the most logical class of prospect for the handling of airplanes. General merchandise firms dealing in hardware and agricultural implements, and machinery houses, would in some cases serve as good connections. Native aviators with war experience have been known to interest such firms as these in the importation of airplanes. Organizations with shops for the repair of automobiles and tractors could expand their facilities for the repair and service of airplanes and engines. The names of firms dealing in aircraft, together with suggestions as to those who might be interested are available at the Aeronautics Trade Division.

THE NEW *Detroit* CITY

By John T. Nevill
Detroit Editor of Aviation

The members of the industry who visited the 1929 All-American Aircraft Show heard many rumors about the "wonderful" airport which would be the scene of the 1930 show. Those rumors, like many others that were floating about at the time, were promptly forgotten by many as soon as the city limits of Detroit passed by the trailing edge of the lower wing. ¶ *However, rumor has become a most decided fact, and the "wonderful" airport is the scene of the 1930 All-American Aircraft Show. In this article Mr. Nevill describes in detail the equipment installed, and relates of the various obstacles that had to be overcome before the port was a reality.*

A FITTING EXAMPLE of how marshy, bush-covered wastelands can be converted into a public work arousing civic pride is the new Detroit City Airport on which the Motor City is being held this week, the third annual All-American Aircraft Show.

A majority of the pilots and aircraft executives landing upon the airport are perhaps finding it difficult to believe that little more than one year ago the property, under guidance of the municipal Department of Public Works, was just beginning to emerge from the mire it had known for years; that the entire length of its longest stretch was marred by a creek bottom, an unsightly sink 200 ft. wide and, in places, as much as 20 ft. deep; that the property was, in fact, two rectangular tracts pointing 80 deg. from one another and completely separated by a paved public thoroughfare several hundred feet wide; that practically every square foot of both of these strips was soft ground; that the very intersection of these two tracts was the site of both a gas-holder, 330 ft. high and a cemetery containing 1,400 graves, with plenty of lots left for more—a forceful "cause and effect" setting for the cautious airman. And, as if this were not enough, the property also was not without the inevitable high tension power line which stretched along its longest border dangerously high above the ground. And—oh, yes—a $200,000 garage and supply building owned by the Detroit Fire Department was situated well within the coveted area, which meant that it had to be razed and rebuilt elsewhere.

These, and other "little" matters, like the condemnation and rebuilding of a gas plant, the condemnation of a cemetery with the consequent removal and re-burial of 1,400 dead, the closing of a much used public thoroughfare over the protest of a hundred un-airminded and unappreciative taxpayers, were all the factors city officials had to take into consideration.

A rather discouraging picture from an aeronautical standpoint, but not entirely hopeless. Two rather important facts determined the definite selection of the site for development as an airport. One was that the City of Detroit already owned the property and the other was that the site was close-in, being only five miles northeast of the City Hall. So, late in 1927, while the City's legal department was just beginning to wade into the maze of litigation that, to some extent, still clings about the airport like so many persistent cobwebs, the Department of Public Works, under direction of the City Council, rolled up its sleeves and began to "drive out the crickets and frogs."

Before going into detail as to just what the Detroit City Airport is like today, it might be explained that the gas-holder and the cemetery are still there, although other development work on and about the airport has softened considerably their somewhat ominous presence. The Fire Department garage, of course, has been razed, and the power line has been placed underground. Additional acreage acquired, particularly 18½ acres lying between the gas-holder and the original juncture of the two tracts, has swelled the airport area to approximately 250 acres. The closing of French Road, the bi-secting thoroughfare, is, at this writing, still an unaccomplished achievement, the city's hand being stayed by a taxpayer's injunction, although two of the airport's hard surfaced runways now extend across the road and surface traffic along the thoroughfare is controlled to accommodate airplanes using either of the runways.

Notwithstanding these drawbacks, which time, no doubt, will erase, Detroit City Airport today is a credit

AIRPORT

Artist's drawing of the Terminal building to be erected at the Detroit City Airport

to the community, particularly when considering its convenient location. Its size and equipment is sufficient to give it a first-class daytime Department of Commerce rating and when night lighting facilities are completely installed Detroit's airport will possess an A-1-A rating. The entire property has been filled in, graded, drained, seeded, rolled and fenced in. Approximately one million yards of fill were required to grade the property so that it had no slope more than 2 per cent in any direction. The drainage system consists of 17 miles of 4-6 in. drain tile in stone-filled trenches and five miles of 12-18 in. lateral sewers, laid in grid fashion and connected to a trunk sewer, which is a part of the city's sewage system. The fencing is of the chain link and wrought iron type and measures in all 22,600 ft., or nearly four miles.

Three hard surfaced runways (concrete and asphalt) extend for a total distance of 2½ miles at this writing. One of the runways extends along the center of the north-south airport leg for a length of 4,900 ft. The second runway extends down the east-west leg for a distance of 4,150 ft. These two runways intersect near their lower ends. The third runway now in extends diagonally across these two landing strips like the cross member in a letter A, and measures 2,825 ft. in length. When completed each runway will consist of two pavements, 100 ft. wide and 300 ft. apart, all of the surface being suitably drained. Although the "double runway" system has not been completed except for 1,000 ft. on the north-south strip, its construction is not far off. It is also proposed to put in a fourth set of runways extending diagonally across the east-west, or lower leg, and running at an approximate right angle to the diagonal runway now connecting the two legs. The runways already in have cost a total of $282,811.

IN ADOPTING the use of paved runways and at the same time going to considerable length in developing the remainder of the field it was the idea of City Engineer Perry A. Fellows, and Wililam J. Wallace, engineer-manager of the airport, to embrace both the hard surface landing strip theory and the "all-over" idea. The double runways paralleling one another, were, of course, designed to accommodate a traffic control system to be placed in effect later. Mr. Wallace, incidentally, has worked out a system of traffic control especially for handling the hundreds of planes expected on the airport during the Show.

The city built the first hangar on the airport in April last year. It is a comparatively small but completely modern building costing approximately $55,000 and suitable for about 15 planes. Since then a $42,000 hangar and field office building has been privately built and is now being used by Schlee-Brock Aircraft Corporation, as has a somewhat costlier hangar by Lawrence P. Fisher. It might also be said that about a year ago the City Council placed operation of the City Airport in the hands of the Commissioner of Public Works, whereupon Mr. Wallace, a member of the city engineer's staff, was placed in direct charge of the work, as acting-manager, with the title of Engineer-Manager. Since that time Mr. Wallace has become a student-pilot and now is about to make his first solo.

Another matter that must be mentioned involves the night lighting facilities. A Holophane boundary lighting system costing $23,850 has already been installed, the Council has just let a contract for installation of obstruction lights, and has asked for bids on a 4,000,000 cp. revolving beacon, as well as a 5,000 cp. auxiliary or

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WILLIAM J. WALLACE, engineer-manager, Detroit City Airport, and R. D. Bedinger, Department of Commerce inspector at Detroit, have drawn up the following air traffic rules, which, in addition to the usual Department of Commerce regulations, are being strictly enforced at City Airport during the All-American Aircraft Show:

- *All traffic around the airport will be counter-clockwise.*
- *Before landing circle airport 180 deg. counter-clockwise to get in line of traffic.*
- *Minimum altitude over the airport, or adjacent thereto, will be 1,000 ft.*
- *Takeoffs will be made from a point designated by the starter and only on the starter's signal.*
- *No stall takeoffs, zooms, or climbing turns will be permitted on takeoffs, and such maneuvers will be regarded as acrobatics.*
- *Planes taking off will clear the boundaries of the airport before commencing the first turn, which must be to the left.*
- *Landings will be only on the area designated by the field manager, and marked with a T, and should be made as close to the T as is practicable.*
- *No acrobatics, except over the vacant area north of the airport and east of the cemetery there, will be permitted.*
- *Parachutes must be worn in all acrobatics.*
- *When starting engines wheels must be blocked and the cockpit must be occupied.*
- *Airplanes will not be left with engines running, unless someone is in the cockpit.*

identifying beacon. A system of floodlighting the peculiar shaped field from atop the gas-holder is now being studied and the call for bids on flood lights will await the findings of this study. It is reported, however, that a number of manufacturers of airport lighting equipment, exhibiting in the Show, have offered to give practical exhibitions of their products by floodlighting the field with temporary installations during the Show.

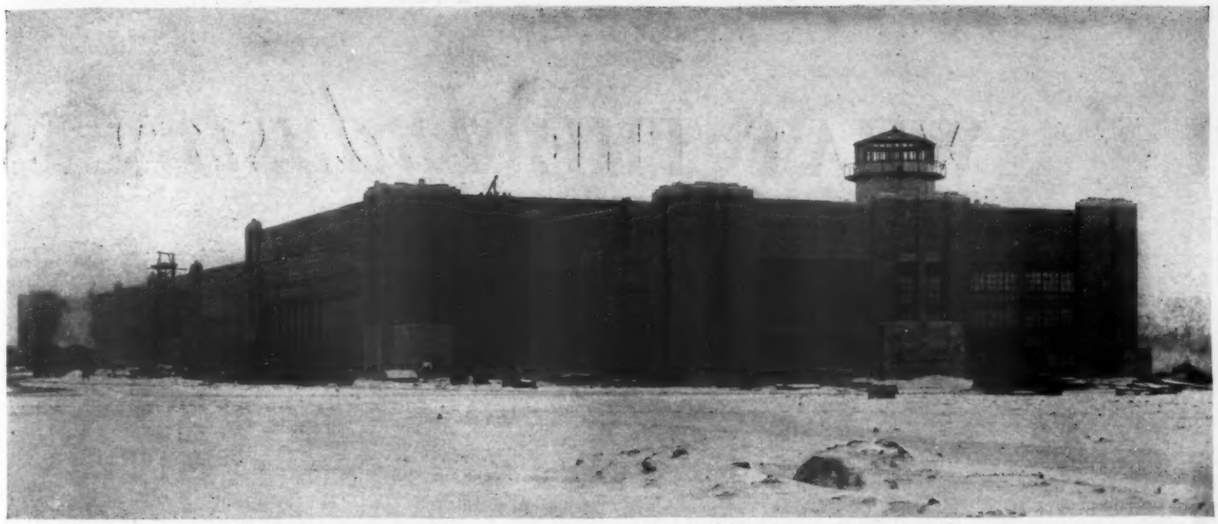
AFTER A SERIES of inter-factional or inter-political disagreements, during which the City Council footballed the main hangar project back and forth among themselves, an architect who had been retained by the Council to design the hangar was paid off and the Dept. of Public Works given the assignment of designing and contracting for construction of the building. Despite the handicap of having to use more than $300,000 worth of steel contracted for by the Council, designed and fabricated for the original architect's building and having to erect a suitably sized building costing approximately half as much as the originally designed structure, the Department and the W. E. Wood Company, contractors, have completed a strictly modern hangar and administration building that can be rightfully called the world's largest airplane hangar.

The Detroit City Airport Hangar extends north and south for a distance of 1,014 ft. along the lower or southermost portion of the airport's north-south leg. To be more explicit it lies between the cemetery, which borders French Road on the east, and Connors Avenue, which borders the north-south leg on the east. As stated, it is 1,014 ft. long and 250 ft. 5 in. wide at its widest portion, which is through the bay at the southern end. Throughout the middle section it is 204 ft. wide and 127 ft. 5 in. wide through the northern bay, which bay faces the port's usable area. This latter section will contain the administration offices, customs and immigration offices, ticket office, concessions, pilots' club room, newspaper press room, lavoratories, and other features, all grouped around a large waiting room similar to that of a railway depot. This bay, alone, measures 127 ft. 5 in. x 114 ft. 4 in. outside. Above it, at the northernmost tip of the structure, is a polygonal observation and control tower, framed with glass and steel. This tower, which will be equipped with all modern field control facilities places the observers' eyes approximately 50 ft. above the ground. The remainder of the structure's roof is approximately 40 ft. high.

Perry A. Fellows, city engineer, Detroit, Mich.

Constructed of steel and brick, with approximately 60 per cent of its exterior comprising door and window area, the huge building has a strong tendency to dwarf the field, although, due to its location it is completely out of the way of all flying activities. The building contains a total of 205,000 sq.ft. of floor space, approximately 193,000 sq.ft. of which will be used for storage, service, and loading purposes. Just behind the administrative section, is one large bay, the inside dimensions of which are 180 x 200 ft. Just south of this is

Air view of Detroit City Airport. "A"—hangar and exposition building. "B"—service hangar. "C"—land available for future development. "D"—gas-holder. "E"—hard surfaced runways



Front view of main hangar and exposition building at Detroit City Airport. Note control tower.

the large central section containing 10 bays, each 121 x 100 ft., which space, in turn, gives way to two additional bays at the southernmost end, each measuring 115 x 125 ft.

The structure is founded upon a total of 1,102 concrete piles, each rooted from 25 to 50 ft. in the ground. Floors of the hangar proper are of concrete, suitably drained, and all interior walls are faced with salt glazed interior face "Brictile." Roofing is of Johns-Manville 15 year bonded composition over ½ inch "Insulite" insulation and resting on a pre-cast Haydite concrete channel tile roof deck.

The experienced airport operator will be interested in the heating, lighting, operation of the doors, and fire prevention features of this structure, all of which have been installed at a great primary cost to the city. Probably the most interesting of these is the deluge type fire prevention system, which was installed by the Automatic Sprinkler Corp. of America at a total cost of $151,500. The system consists of 2,600 dry pipe ceiling and floor heads which go into operation automatically following a rate of temperature rise of 15 deg. per minute. Thirteen hundred of the heads are located in the ceiling and 1,300 in the floor, all being spaced 10 ft. from one another in each direction. Every 6,000 sq.ft. of space above the bottom of the building's trussing is enclosed by a metal draft curtain, which concentrates the heat, causing early operation of the heads in one compartment and preventing operation of more heads than are necessary to extinguish the fire. Each one of these 6,000 sq.ft. areas is equipped with its own 6 in. sprinkling valve, which valve is opened by any one of four actuating devices located in the compartment.

It should be understood that the degree of heat, alone, will not affect the actuating devices; rather, their operation is caused only by the rate of temperature rise of at least 15 deg. per minute, which places the possibility of their going into operation during excessively hot midsummer days quite out of the question. Following total extinction of a fire the valves are closed manually. The entire sprinkling system is fed by a 24 inch water main, part of the city's system, which operates under an approximate pressure of 50 lb.

The Fenestro doors, which, of course, extend along both sides of the structure, are of the tubular straight track type and supported on 16 lb. rails flush with the floor. In the smaller bays a 20 x 99 ft. clearance is provided, while that of the larger bays is 25 x 149 ft. Although the larger doors provide sufficient clearance to admit the largest heavier-than-air craft now built in this country without necessity of dissembling, provisions have been made to increase the height of the doors from 25 ft. to 30 ft., when that becomes necessary. The larger doors, incidentally, have been motorized by installation of Allen and Drew duplex drive heavy duty electric motors, and can be opened or closed by the pushing of a button above the motors.

Heating in the hangar area is provided by floor mounted American Blower unit heaters employing a steam gauge pressure at the boiler of 125 lb. per sq.in. Muliple outlets in these heaters will discharge air at high velocity. The system is designed to maintain a breathing line temperature of 55 deg. F. under the most severe outside weather conditions. A lighting system providing approximately one Watt per sq.ft. and controlled from panel boards located near the entrance of each bay takes care of night-time illumination. The large percentage of window and door area already mentioned will provide ample daytime lighting.

ALL OF THE WORK done at Detroit's city airport, the filling, draining, grading, runways, fencing, lighting and the two municipally erected hangars now completed has been financed by a portion of the $5,000,000 bond issue voted by the taxpayers in November, 1928. Before closing it should be stated that the main hangar, costliest of the projects, was designed to fit a more comprehensive future plan, prominent in which plan is a proposition to erect a separate administration building, fittingly modern, which would increase service and storage facilities in the present hangar by nearly 15,000 sq.ft. Under architects' drawings already prepared this future structure would occupy the area now belonging to the cemetery association, which the city is attempting to purchase at the present time.

In fact, it has been stated that when it is absolutely necessary, it will not be impossible to acquire practically all of the property now lying between the airport's two 80 deg. legs, and turning the property into a triangular airport, rather than an L shaped one.

WHAT THE *Industry* IS

A Listing of the Various Products of Airplane and Now or that Will be Placed

IN THE International Aircraft Exposition number of AVIATION (Feb. 15) there was printed a symposium by leaders in the American aeronautic industry on 1930 merchandising and design trends of both aircraft and engines. The symposium, which was continued through two other issues of AVIATION, was the result of a questionnaire sent to the industry's executives with the request for individual expression of opinion. The expressions of opinion regarding the industry's major problems were not only interesting but most informative. Therefore it seems altogether fitting that this Merchandising and Show Number of AVIATION should contain a listing of the products that those manufacturers intend to develop and merchandise during the current year. Many of them are on exhibition this week in the main hangar and exposition building at the Detroit City Airport, the others we may expect to view between now and the Yuletide season.

Airplanes

ALLISON

FOUR NEW PLANES will be offered by the Allison Airoplane Company of Lawrence, Kan. The first is a single-seater, semi-cabin, high-wing monoplane with a Szekeley 40-hp. engine, which will be priced at $1,785. The second will be a two-seater dual control light biplane, powered with a Velie or LeBlond engine, and priced at $2,285.

As a third offering, the company will put out a two-seater, side by side, high-wing open monoplane, powered with a 90-hp. air-cooled engine. The fourth plane will be a single-seater light biplane with an engine of approximately 30 hp. Data on the last two planes, at the present time, are not available.

AMERICAN EAGLE

A NEW FOUR-PLACE cabin monoplane is being introduced this season by American Eagle Aircraft Corp., Kansas City, Kan. The standard model carries a Wright J-6 165 hp. engine, but other engines may be fitted if desired. Features of the plane are wide visibility, 9-ft. landing gear tread, wheel brakes, tail wheel, folding wings, three doors to the cabin. High speed with the 165 hp. engines is given as 142 m.p.h.

Wallace Aircraft Co., division of the American Eagle corporation, will continue to build the Wallace Touroplane, a three-place folding-wing cabin monoplane selling for $5,795 with Kinner engine. The Wallace plant is now located in Kansas City. The American Eagle company will also continue to build five models of open cockpit biplanes, with power plants ranging from OX-5 to Wright J-6 225 hp. engines, as part of a program which aims to present a wide variety of planes.

BIRD WING

THE BIRD WING COMMERCIAL AIRCRAFT COMPANY of St. Joseph, Mo., will concentrate production during 1930 on the Bird Wing Imperial. This plane is particularly adapted to use by flying schools and for private and cross country flying. It has passed all of the approved type certificate tests required by the Department of Commerce.

BUHL

THE BUHL AIRCRAFT Co. at Marysville, Mich., has announced a conservative production schedule for the year 1930. During the coming year, the company will continue to manufacture Airsedans, with models ranging from the eight-place cabin sesquiplane priced at $19,500 with Wright Cycolone or Hornet engine, to the three-place cabin machine selling for $11,000 with Wright 225-hp. engine.

BOEING

IN ADDITION to the military planes which will be built for the Army and Navy, Boeing Airplane Co. is manufacturing several commercial models. Model 100, a sportsman's version of the P-12 military model, developed speeds in excess of 200 m.p.h. during recent tests.

OFFERING FOR *1930*

Engine Manufacturing Companies that Are Available on the Market This Year

The company is also offering an improved modification of Model 204, six-place flying boat, with speed said to be increased 15 m.p.h., take-off reduced by 8 sec., and rate of climb improved by 250 ft. per min.

Two types are offered for transport use. The 40-B-4, four-passenger mail plane with Hornet engine and top speed of 140 m.p.h., has been in use for some time on several different routes. A new eighteen-passenger tri-engined transport, representing a development of the company's earlier model 80, was introduced last summer, and several of the planes are now in active service. All Boeing commercial planes are now shielded and wired throughout for radio installation.

BURNELLI

THE LINE OFFERED by Uppercu-Burnelli Aircraft Corporation, for 1930, will include both large and small planes. Burnelli transports of twenty- and thirty-passenger capacity, at $55,000 and $85,000 respectively will be built to order. The company will also offer twenty- and thirty-passenger amphibions using the Musselmann amphibion gear. These amphibions will sell for $65,000 and $95,000 respectively.

Aeromarine land, sea and amphibion planes will be produced. These are two place low-wing monoplanes with open cockpits. The amphibion, with 100-hp. engine, sells for $5,000, the seaplane, with a 60-hp. engine, for $4,500, and the land plane, with the same engine, for $3.500.

Aeromarine wooden propellers of all sizes will be built on order. Aeromarine, radial, air-cooled, 115-hp. engines will be built. This engine holds the Department of Commerce Approved Type Certificate Number 41.

CURTISS

SEVERAL MODELS of the Fledgling three-place biplane trainer, using a variety of engine equipment, will be offered by Curtiss Aeroplane & Motor Co., Garden City, L. I., N. Y. Aside from additions to the types of engines with which it may be fitted, the plane will be substantially the same as last year's model. The company is also introducing the Kingbird, a seven-passenger, cabin monoplane, powered with two Wright J-6-7 engines.

Curtiss-Robertson Airplane Manufacturing Co., St. Louis, Mo., will continue to produce the Robin, a three-place cabin monoplane powered with Curtiss Challenger, OX-5, or Wright J-6-5 engine. A modified Robin seating four has also been introduced, resembling the three-place machine closely in other respects. The price of the three-place Robin is $4,000 with OX-5, $7,500 with Challenger or Wright engine.

CAVALIER

FOUR TYPES of Star Cavalier cabin monoplanes will be produced during 1930 by the Star Aircraft Company of Bartlesville, Okla. All of these planes will be identical except for engine equipment. Two models powered with Lambert engines of 65 and 90 hp., respectively, will sell for $2,985 and $3,450. The model with the Gnat will sell for $3,750, while that powered with a LeBlond will sell for $2,985.

COMMAND-AIRE

COMMAND-AIRE, INC., Little Rock, Ark., begins 1930 with three models in production. A two-place training plane with Warner engine, having Goodyear air wheels as standard equipment, sells for $4,165. The standard Command-Aire three-passenger sport plane is now offered with Challenger engine at $5,950, and with Edo pontoons for $1,000 more. A new model with Lycoming 210 hp. engine, special landing gear and tail wheel, sells for $5,675. It is anticipated that other models will be added to the line later in the season.

EASTMAN

EASTMAN AIRCRAFT CORP., which became one of the units of Detroit Aircraft Corp. last year, will continue manufacture of the three- to four-place open flying boat which has been the company's standard model for some time. It is powered with a Curtiss Challenger engine, mounted to drive a pusher type propeller, and the list price is $9,595, flyaway Detroit.

DAVIS

DAVIS AIRCRAFT CORP. is presenting two new monoplanes for 1930: the Davis D-1, powered with the LeBlond 65 engine, and the Davis D1-K, powered with the Kinner engine. Both are two-place, open cockpit planes, and both embody the wing design characteristic of Davis Monoplanes.

Both the Davis D1-K and the Davis D-1 are of all-metal construction throughout, with the exception of

wing spars of laminated spruce, and fabric covering. Ribs are of duralumin. The entire leading edge is of sheet duralumin screwed to spars and riveted to ribs. Drag bracing is of double Hartshorn square rod. Simplicity of design permits removal of wings in few minutes. The Davis D-1 lists at $3,285 complete, and the Davis D1-K at $3,485 complete, flyaway at field, Richmond, Indiana.

EAGLEROCK

ALEXANDER AIRCRAFT CO., Denver, Colo., will continue to produce the well-known Eaglerock three-passenger biplane during the coming year. It is offered with Wright J-6 Five, Comet, or Kinner engine, being priced at $3,907 with Kinner power. The plane is also obtainable less engine and propeller for use with OX-5, OXX-6, or Hisso engines.

In anticipation of a growing market for fast cabin planes, the company is featuring the Alexander Bullet, a four-passenger low-wing monoplane introduced last year, which is said to have a speed of 150 m.p.h. with Wright J-6 165 hp. engine. As in the past, Alexander Aircraft Co. will continue development of its own nation-wide system of distributors and dealers. A primary type glider is also included in the line, as it is felt that through the development of gliding, the market for planes may be increased.

ENGINEERS

ENGINEERS AIRCRAFT CORP., Stamford, Conn., is planning to put a new plane into production. This plane will be known as Model EAE-1, is a two-seater, side-by-side, parasol monoplane, for sport and training. Due to a wide sweep-back of the wings, good visibilitiy is provided. The plane will be powered by a Wright Gipsy engine, and will sell for about $5,000.

FAIRCHILD

A NEW TWO-PLACE open biplane for sport and training, with tapered wings and carrying Kinner engine is added to the line of planes offered by Fairchild Aviation Corp., Farmingdale, L. I., N. Y. It is designated as model KR 21, for 1930. This model sells for $4,685. The company will also continue production of the Fairchild KR-34, three-place open biplane with Wright J-6-5 engine, selling for $6,575.

Two cabin monoplanes, features folding wings, are included in the Fairchild line. Model 42 is a four-place machine with dual control, powered by a Wright J-6-9 engine, selling for $12,900. Model 71, intended for transport use, carries seven passengers and uses a Wasp engine. It is priced at $18,900.

FLEET

THREE MODELS CONSTITUTE the line offered by Consolidated Aircraft Co., Buffalo, N. Y., for 1930. The Fleet two-passenger training plane, a development of the Husky training planes made by the same company for the Army and Navy, is offered in a new model with either Kinner or Warner engine, priced at $3,985 and $4,985. With Edo pontoons, it costs $1,010 more.

The Fleetster all-metal monoplane, designed to carry six passengers with mail or freight at a high speed of 175 m.p.h., will be put into actual production. Six models are being built on pontoons for NYRBA line. With land type undercarriage and Hornet Series B engine, the plane sells for $27,500. The Consolidated Co. will also continue production of the Commodore dual-engined twenty-passenger flying boat, fourteen of which have been ordered by NYRBA line. This plane also carries Hornet power, and is listed at $125,000.

FOKKER

THE PRE-EMINENT DEVELOPMENT of the Fokker Aircraft Corp., Hasbrouck Heights, N. J., for 1930 is the F-32, the largest land plane built in America. The first of the six planes of this type ordered by Western Air Express is now in service, the second is in process of delivery and the remaining four are on the construction line at the company's Hasbrouck Heights plant.

With the amphibion and boat priced at $42,000 and $40,000 respectively, the tri-engined machines at $67,500 and $49,000, the mail planes at $26,500 and the Super-Universals and Universals at $21,800 and $15,000, the Fokker line remains in the relatively high priced class.

FORD

AMONG THE NEW MODELS in the 1930 line of Ford all-metal tri-engined airplanes, built by Stout Metal Aircraft Co., Dearborn, Mich., are the de luxe club planes of the 5-AT type which are furnished with either landing gear or pontoons and which are offered with a wide choice as to interior accommodations and decorations. The price varies from $60,000 to $65,000.

Another Ford plane recently introduced is the 7-AT tri-engined land plane. Its dimensions follow closely those of the 5-AT, the essential difference being the substitution of two Wright J-6 300 hp. engines for two of the Wasps. This gives a total horse power of 1,025 and results in marked economy in operation. The maximum speed is 134 m.p.h. and the cruising speed 110 m.p.h. The price is $51,000.

The Ford line also includes the 4-AT land plane and the 6-AT sea plane, each powered by three Wright J-6 engines. The 4-AT sells for $42,000 and the 6-AT for $64,000.

The company also builds a 9-AT, which is of the same size as the 4-AT, but which is powered by Pratt & Whitney Wasp Junior engines.

KARI-KEEN

KARI-KEEN AIRCRAFT, INC., Sioux City, Iowa, will produce the Kari-Keen coupe, a two-place cabin monoplane designed for the use of training schools and private owners. The plane is built to sell at $3,450 delivered at the factory. It has side-by-side seating arrangement, and uses a full cantilever wing.

KREUTZER

JOSEPH KREUTZER CORP., Los Angeles, Calif., will continue during 1930 to produce a tri-engine cabin plane. Four models will be offered: the K-3, powered with three 90-hp. LeBlond engines will sell for $19,000; the K-4 and K-5, powered with Warner and Kinner engines respectively, will sell at $22,000 and $20,000; model K-6, a five-place plane equipped with Edo floats and three Kinner engines, will sell at $23,000. The present factory capacity is six or seven planes per month.

LINCOLN

AT LINCOLN, NEB., the Lincoln Aircraft Company will continue to produce their well-known line of PT aircraft. The original PT equipped with a rebuilt OX-5 engine will sell for $2,565. The Lincoln PTK powered with a Kinner engine will sell for $3,865, while the PTW, equipped with a Warner engine, will sell for $4,315. All of these models carry a Department of Commerce approved type certificate.

LOCKHEED

LOCKHEED AIRCRAFT CO., Burbank, Calif., continues production of the five- and seven-passenger Vega, the four-place Executive, and the new one- or two-place Sirius low-wing monoplane. All four models have Wasp engines, and are priced between $18,500 and $19,250. The characteristic Lockheed construction with cantilever wing and plywood monocoque fuselage is, of course, continued.

The factory at Burbank, Calif., now has a capacity of twelve planes per month, and a policy of two-weeks' delivery has been adopted so that finishes and painting can be applied to individual purchasers.

METEOR-PLANE

IN ADDITION to continuing production of the standard line of Meteor-planes, Irwin Aircraft Co., Sacramento, Calif., will introduce a new model designated as F-A-1. It is a one-place open biplane, powered with the Irwin four-cylinder radial 20-hp. engine, said to give it a top speed of 85 m.p.h. The plane sells for $1,165.

MONOCOUPE

MONOCOUPE 90 is the designation of the latest product of Mono Aircraft Corp., Peoria, Ill. It is a two-place high-wing cabin monoplane, using the Lambert R-266 90 hp. engine. Features are tapered wings, brakes, navigation lights, optional color combination, and high speed of 120 m.p.h. The price is $3,375, and deliveries will be made after April 1.

Four other models are continued in production. The Monoprep is a two-place dual control training plane, using Velie M5 engine, selling for $2,835. Monocoupe 65 is a sport model with the same engine, capacity and price. The Monosport, also two-place, uses Kinner or Warner Scarab engine and has rather higher performance. The last model in the Mono line is the Monocoach, a four-place dual control plane with Wright J-6-7 engine, selling for $8,250. Its high speed is 133 m.p.h., and cruising speed 112 m.p.h. All of these machines are high-wing cabin monoplanes.

MOTH

MOTH AIRCRAFT CO., St. Louis, Mo., is offering for 1930 a special sport edition of their well-known model, carefully streamlined with headrest, racing windshield, special undercarriage, enclosed front cockpit, etc. The front cockpit may also be left open, and a detachable windshield fitted so that a passenger may be carried. There is a specially large luggage compartment. Color combination is optional, and the price is $5,500. The standard model Moth is changed very little in appearance, but the fuselage has been strengthened by the use of stronger tubing and additional heat treatment, and there are a number of minor refinements. It sells for $3,960 flyaway St. Louis, Mo., with Gipsy engine.

OSPREY

OGDEN AERONAUTICAL CORP., Inglewood, Calif., will continue to produce the Ogden Osprey, a six-place tri-engine cabin monoplane. This plane is powered with three air-cooled in-line engines. It will sell for $18,900, fully equipped including starter, wheel brakes and instruments. Production for the coming year will be centered on the Osprey, while design research will be started on a small three-engine amphibion of unique design, also using in-line engines.

The company also plans to continue production of its Combination Wheel Gear. Many of these have been installed during the past year and it is expected that they will become increasingly popular this year.

PARKS

PARKS AIRCRAFT DIVISION of Detroit Aircraft Corp. is manufacturing for general sale three models of the three-passenger training plane which was developed for the use of Parks Air College. The price is $3,165 with OX-5 engine, $6,000 with Axelson, and $6,350 with Wright J-6 165 hp. engine. The machine is a single-bay open cockpit biplane, of conventional construction. It is now being manufactured in plant No. 4 of the Detroit Aircraft Corp., in Detroit.

PHEASANT

PHEASANT AIRCRAFT CO., Fond du Lac, Wis., will have two models of the Pheasant Traveler in production this year. The one-place cabin model will sell for $1,495, and the two-place cabin plane will sell for $1,795. Both of these ships are monoplanes and are powered with Flight engines manufactured by the company in its own plant.

PINTO

THE NEW MODEL PINTO is manufactured by Mohawk Aircraft Corp., Minneapolis, Minn. It is a two-place, open cockpit, tandem, low-wing monoplane, designed and built to suit needs of private owners and aviation schools. Manufacturing program for 1930 has not yet been completed, but announcement is expected shortly. A tentative list price of $5,300 has been set on this model. This price will include brakes and other special accessories and equipment.

The plane is Kinner powered, and is equipped with fittings to take Edo pontoons or skiis without changes to the airplane structure. For training purposes the front cockpit is equipped with controls, stabilizer adjustment mechanism, tachometer, oil pressure gage. The rear cockpit has all motor instruments, compass, pitch indicator, air-speed indicator, starter, pressure gage, and release handle.

PITCAIRN

PITCAIRN AIRCRAFT, INC., Willow Grove, Pa., will produce improved models of their standard mail planes during 1930. The principal changes in the new model are the use of round wing tips and a new type of balanced aileron. A sport model will also be produeed for

private use. It will be a two place open-cockpit biplane. For solo flying the second cockpit may be faired over.

PRUDEN-WHITEHEAD

ATLANTA AIRCRAFT CORP., Atlanta, Ga., will produce for 1930 the Pruden-Whitehead plane. This plane may be used as a transport, for executives, or for wealthy sportsmen. It is an eight-place, tri-engined, all metal, low-wing monoplane. At present, no price for this plane has been announced.

RYAN

A NEW RYAN DE LUXE BROUGHAM is featured this year by Ryan Aircraft Corp., St. Louis, Mo., powered with a Wasp engine and selling for $16,900. Like the standard model B-5 Brougham, priced at $13,250 with Wright J-6 300 hp. engine, the new model B-7 has places for six. The company is also bringing out the Foursome, a smaller plane of similar design, powered with a Wright J-6 225 hp. engine and priced at $10,900. The Ryan factory at present has a capacity of twelve planes per month.

SCOUT

PACIFIC AIR INDUSTRIES, Los Angeles, Calif., will continue to produce the Scout monoplane. Three models in all will be built. The two-place Scout Junior, will sell for $1,450; the four-passenger Scout Senior, will sell for $2,450; while the Scout cruiser for pilot and six passengers will sell for $4,500. These prices do not include engines.

SIKORSKY

SIKORSKY AVIATION CORP., Brigeport, Conn., will continue production of the S-38 during 1930. This amphibion, using two, Pratt & Whitney Wasp engines, is being widely used throughout North and South America and the Hawaiian Islands. It is an eight- to ten-passenger, two-pilot machine, and is equipped with the well known Sikorsky features.

A new project to be undertaken by the company is the S-40, the largest amphion in the world, which will be powered with four Pratt & Whitney Hornet Series B engines. Two of these have been ordered by Pan-American Airways. for service between Miami, Fla., and Cristobal, Panama. The S-40 will be approximately twice the size of the S-38, and is designed to carry 41 passengers.

STINSON

SIX MODELS will make up the 1930 line of Stinson Airplane Corp., Detroit, Mich., division of the Cord Corp. All are cabin monoplanes. The feature model is the Stinson-Detroiter Junior, slightly modified from the 1929 version, equipped with Lycoming R-680 210 hp. engine, priced at $5,775. The Junior is also available with Wright J-6 225 hp. or 300 hp. engines. Equipment includes Eclipse starter, metal propeller, and Kelsey-Hayes wheels and brakes.

Two models are offered in the Stinson-Detroiter Senior type. This is a six-place plane with Wright J-6 300 hp. or Wasp 425 hp. engine. These are priced at $10,495 and $15,995 respectively. The overall dimensions of the Wasp model are considerably larger than those of the Wright-powered plane, though the passenger capacity is the same.

The Stinson Co. is also about to introduce a ten-passenger transport plane, powered with three 210 hp. Lycoming engines, to sell for $23,900.

SPARTAN

SPARTAN AIRCRAFT CO., Tulsa, Okla., will produce three models for 1930: the first, a three-place open biplane equipped with a seven-cylinder Comet engine, will sell complete for $5,675; the second, a C-3-165 model with a five-cylinder Wright engine, will sell for $5,975. The last of the line, the C-3-225 model, powered with a seven-cylinder Wright engine, will sell for $7,750. Spartan has also in preparation a four-place dual control cabin monoplane equipped with a seven-cylinder Wright engine which has a wing span of 50 ft. This plane will sell for about $10,000.

SWALLOW

TWO ENTIRELY NEW models for 1930 are now being tested by Swallow Airplane Co., Wichita, Kan. A four-place low-wing cabin monoplane is expected to be ready for production by some time in March, and the Sportwing models are to be ready soon after that. These are three-place open biplanes built to use Kinner or Warner Scarab engine in the Junior model, and Wright J-6 225 hp. engine for the Senior model. In addition to these new planes, the Swallow company will continue to build the well-known TP trainer, carrying OX-5, Kinner or Warner Scarab engine, with price ranging from $3,123 to $4,600; and the Commander, selling for $3,750 with Hisso engine and $5,950 with Axelson engine.

TAYLOR

TAYLOR BROS. AIRCRAFT CORP., Bradford, Pa., will have two planes in production during 1930. The first, a training plane powered by a Kinner K-5 engine lists at $4,375, equipped with dual control. The second, a sport machine, also powered by Kinner, lists at $4,550, equipped with heater, brakes, dual control and instruments. The company also expects to have a four place plane powered with a Wright J-6-5 ready for government test about July 1.

TRAINAIR

MELIAS & BROS., INC., Buffalo, N. Y., will put into production during 1930 a new "Trainair," powered with a Kinner engine and priced at $4,075.

The company will also continue to manufacture three-place open biplanes with Axelson, Kinner, Wright J-6 165 hp. or 225 hp. engines. In addition, there is a new model with a 140 hp. Ace engine, and minor modifications in design.

TOWLE

TOWLE AIRCRAFT CO., INC., of Detroit, Mich., for 1930 includes five-place amphions and eight-place flying boats. They are both of metal construction, Alclad being used throughout. The planes are powered with two Wright engines of 220 hp. each, located above the metal

wings. These wings are of full cantilever construction. Hulls are of the double type. The landing gear is a hydraulic, power-operated mechanism. In flying position the landing wheels are inclosed in the floats to decrease drag. A price of $25,000 is placed on both of these planes.

TRAVEL AIR

TWO NEW MODELS have been announced by Travel Air Manufacturing Co., Wichita, Kan. A four place cabin monoplane, powered with Wright J-6 225 hp. engine, will be known as model 10-D. It is essentially similar to models A-6 A and 6,000 B, powered with Wasp and J-6 300 hp. engines respectively, which were produced last year. They will be continued, selling for $16,500 and $13,500; the price of the new model has been announced as being $8,495.

WACO

SIX MODELS will constitute the line offered by Waco Aircraft Co., Troy, Ohio, for the coming season. OX and Hisso models will not be changed, and practically no changes have been made in the plane using Wright 165 hp. engine. There will be minor refinements in the Wright J-6 225 hp. straight-wings and Taper-wings. In addition to continuing producing of these widely known machines, the company will introduce a new three-place model using a 100 hp. air-cooled engine, and featuring Bendix wheels and brakes, with a tail-wheel instead of skid. No price changes have been announced.

Engines

ALCO

THE ALCO OIL TOOL CO., of Compton, Calif., is at present developing two engines which they hope to put in production during 1930. The first of these, an opposed eight-cylinder engine of 673-cu.in. capacity, will be well adaptable to wing installations.

The second, a 460-cu.in. seven-cylinder radial engine, with an overall diameter of 39 in., is now being built. It will be rated at 130 hp. at 1900 r.p.m.

AXELSON

SINCE MOVING into a new factory at Los Angeles, Calif., Axelson Aircraft Engine Co. has a potential capacity of 100 engines per month. At present, however, only immediate orders are being filled. The company continues to concentrate on the model A7R seven-cylinder radial, rated 150 hp. at 1,800 r.p.m. The price is $2,900 at the factory. A feature recently introduced is the "pompadour head," a special arrangement of cooling fins over the cylinder head. The engine has been given Approved Type Certificate No. 16.

BLISS

E. W. BLISS CO., of Brooklyn, N. Y., will produce their Jupiter engine during 1930. This engine, which ordinarily delivers 525 hp. at 1900 r.p.m., will be produced in the direct, geared, and the supercharged edition. All of these engines will be produced at various contracted ratios.

CENTURY

CENTURY ROTARY MOTORS CORPORATION, of Canastota, N. Y., will start manufacture on the Century 4-in-line 100-hp. 1950 r.p.m. air-cooled engine. This engine has a bore of 4½ in. and a stroke of 5 in. Its displacement is 318 cu.in. with a compression ratio of 5.3 to 1.

Standard equipment on this engine will include an automtaic supercharger, electric starter, generator, and two Scintilla magnetos, with an overhead cam drive. The production schedule is two motors per day, from the first day of May, 1930.

BROWNBACK

THE LIGHT MANUFACTURING AND FOUNDRY COMPANY has proceeded with their program as originally outlined. The plant is operating daily and production on a quality production basis is proceeding. At present two engines per day of the five engine per day capacity are being built.

CIRRUS

AMERICAN CIRRUS ENGINES, INC., Marysville, Mich. The American Cirrus engine will be continued in production throughout 1930 without change. Aside from the features that have already been incorporated in the American Cirrus, the company does not expect to make further changes in the engine itself.

As an optional extra, the company will equip the American Cirrus engine with a De Palma supercharger. Another development of this company during 1930 will be the American Ensign, which will be an inverted line engine. This engine will also be furnished with the De Palma supercharger as an extra.

The company will undertake during 1930 extensive research and development in gear reduction for the American Ensign.

CHEVROLET

PRODUCTION of the "Chevrolet" four-cylinder in-line, inverted, air cooled motor, built by the Chevrolet Aircraft Corporation of Baltimore, Maryland, will begin sometime during the early summer, probably during the month of June. Final experimental tests are now being run and the preparation of production tools, etc. is being completed. The number of motors to be produced in 1930 will depend a great deal, of course on the demand, and general conditions within the industry.

The motor was very well received by the various manufacturers of aircraft at the show in St. Louis and

the company has every reason to expect a very nice volume of business.

Tests run on this motor since the St. Louis show have shown the power output of the Chevrolet motor to be in excess of previous estimates. At 2000 r.p.m. the output is 100 hp., and at 2100 r.p.m. it is 110 hp. The previous estimate was 90 to 100 hp. at the same speeds.

ARTHUR CHEVROLET

THIS COMPANY will develop two engines, a 4-cylinder and a 6-cylinder, which are inverted, air cooled, in-line models. Both engines have a bore and stroke of $4\frac{3}{8}$x$5\frac{1}{4}$. The 4-cylinder has been rated at 90 hp. by the Department of Commerce, after being put through the regular Department engine tests, and has an approved type certificate.

The 6-cylinder engine has not been offered to the Department of Commerce as yet, but will be very shortly.

The 90 hp. rating is at 2,000 r.p.m., but the engine will develop 110 hp. at 2,250. The weight will be approximately 340 lb.

COMET

THE COMET ENGINE CORPORATION, which offers the Comet 7 cylinder, air-cooled, radial engine, is now located in Madison, Wisconsin, and completely equipped with new production machinery, jigs, dies, and fixtures, installed in a new, modern factory. Manufacturing operations on the Pacific Coast, where production of the engine was originally started, have been discontinued although service parts and personnel are still maintained at the old address.

The design of the engine remains essentially unchanged although minor refinements have been incorporated.

As a result of improved manufacturing economies and the simplified design of the engine, it has been possible to reduce the price list from $3000 to $2700 with corresponding reductions in cut prices to manufacturers.

Due to a slight improvement in the cam design, the manufacturers are applying to the Department of Commerce for a rerating to 165 hp. at 1,900 r.p.m. for this power plant.

DAYTON

CONSIDERING SUCCESS from the angle of production and sales, 1930 promises to be the most prosperous year the Dayton Airplane Engine Company has ever known.

Although the Dayton Bear Engine has been on the market for some time, the efforts of the company have been largely devoted towards experimentation and perfection of this 4-in-line, air-cooled engine. The officials of the company have withheld large scale sale and production until their engine was given every test. Under the supervision of F. Don Williams, chief engineer, the Dayton Bear has been tested and perfected. Mr. Williams now has charge of large production which is well under way.

The Dayton Bear is of the 4-in-line, air-cooled type, generating 110 hp. at 1550 r.p.m. It has been granted Department of Commerce Certificate No. 11.

The engine is now being sold at $750. Quantity production has made this reduction possible.

CONTINENTAL

AT DETROIT the Continental Aircraft Engine Co., a subsidiary of the Continental Motors Corporation, is planning a vigorous production program for 1930.

Three model A70 engines have been running on break down tests for the last few weeks. Up to date, they have completed 25 periods of 25 hr. each of continuous running. These engines are operating at full throttle all the time.

While Continental is now in production on the model A70, their activities will not stop with this design. Design and experimental work are being conducted on other models of various types and, when found adequate, will be added to the present production.

GENERAL

GENERAL AIR MOTORS CO., Scranton, Pa., will produce five- and seven-cylinder, conventional, radial air-cooled, engines during 1930. The five-cylinder engine is rated at 180 hp. at 1900 r.p.m. while the seven-cylinder engine is rated at 250 hp. at 1900 r.p.m. Both power plants have a 5-in. bore with a $5\frac{1}{2}$-in. stroke.

One of the special features of this engine is the valve arrangement. Two intake and one exhaust valve per cylinder actuated by a single intake and a single exhaust push rod, incorporate a unique yoke design under the two intake rocker arms. Employment of a two-way intake pipe permits exceptionally low barrel and head temperatures.

Drawings, patterns, castings, dies and forgings are complete, with some machinery ready for production on the five-cylinder engine. Work on the seven-cylinder engine is progressing very rapidly. Many parts are interchangeable with the five-cylinder engine.

HURRICANE

HURRICANE MOTOR CO., INC., of Houston, Texas, will get into production on their new engine this year. Their production schedule calls for the manufacture of ten engines per month. At present the officials of the company are waiting for the engine to receive an approved type certificate before undertaking further production.

This company will also build a few experimental glider engines during the coming year.

KINNER

THE THIRD QUARTER of the year 1929 marked the entry of the Kinner Airplane and Motor Corporation upon a program of quantity production, resulting in the shipment of a total of 857 K-5 100-hp. engines during the year. In Jan. and Feb. of 1930, 42 engines were shipped out by the company, as compared with 14 during the same period in 1929. From present indications it is estimated that approximately 70 engines will be shipped in March, which will compare with 38 shipped during March, 1929.

Due to the great difficulty which was encountered in securing the necessary automatic machinery, production

at the Kinner plant last year was delayed until the third quarter. Now the machinery has been installed. With its present equipment, the company is thoroughly capable of producing as many as 450 of the 100-hp. engines and 100 of the 190-hp. engines per month.

The production program for the year 1930 contemplates the production of 1,500 of the 100-hp. engines and 500 of the new 190-hp. engines. In the event, however, that a heavy sale of planes results in an increase in the demand for our motors over that which we have estimated, our production can be materially increased upon very short notice and with practically no delay.

LAMBERT

THE LAMBERT ENGINE CO., for 1930, will produce two engines. They will continue production on their popular Velie M-5, and will place in production their new Lambert Model R-266.

The Velie M-5 is the engine which is now used quite extensively in the industry. This engine will be continued with minor improvements.

The new R-266 is a larger engine than the Velie M-5, and has an overall diameter approximately the same as that of the Velie. The new R-266 incorporates many ingenious mechanical principles. It will sell for $1,450 f.o.b. the Moline, Illinois, factory.

LYCOMING

THE LYCOMING MANUFACTURING CO., of Williamsport, Pa., have a production program scheduled to start March 1. At the present time their factory is tooled up to produce ten engines per day. The Stinson Aircraft Corporation, another Cord subsidiary, have placed an order with this company for 500 of their engines.

Later in the year the company expects to announce production plans for a new seven-cylinder engine of the same size, their present engine being a nine-cylinder radial air-cooled job developing 210 hp. at 2,000 r.p.m.

Officials of the company report that they are much encouraged over the outlook for the aviation production this year. They report that they firmly believe that those plane manufacturing companies that produce planes on a production basis, properly priced, will enjoy a satisfactory volume of business.

The company does not intend to announce any price on its engines, preferring to quote a price to each individual prospect according to the number of engines for which he will place an order.

MENASCO

MENASCO MOTORS, INC., Los Angeles, Calif., will continue production during 1930 on their "Pirate" engine. This engine is a four-cylinder, in line, inverted, air-cooled engine, rated at 90 hp., at 1800 r.p.m. by the manufacturer.

At the present time there are no figures or data obtainable on the company's plans for production during the coming year. No changes are anticipated in the engine.

MAC CLATCHIE

THE MACCLATCHIE MANUFACTURING CO., of Compton, Calif., will continue to build their Panther engine. This engine is of the L-head radial type. The engine develops 150 hp. at 1,900 r.p.m. and has an overall diameter of 36 in.

The first section of a $200,000 plant has been completed and has been completely stocked with the most modern tools. Straight line production on a large scale is planned for 1930.

The engine has completed its 50-hr. test in Washington, and after a 10-hr. test flight will have an approved type certificate.

PRATT & WHITNEY

THE PRATT & WHITNEY AIRCRAFT CO., of Hartford, Conn., will build just as many Wasp, Wasp Junior, and series B Hornet engines as the industry demands. The company's present production schedule calls for 150 engines per month.

With production started on the new Juniors it is expected that number of engines built per month will rapidly increase.

SZEKELY

THE SZEKELY AIRCRAFT AND ENGINE COMPANY of Holland, Michigan, have been developing light, radial, air cooled, aircraft engines for the past three years and, with the increasing interest in the development of a light, inexpensive plane of comparative low speed built around a low horsepower unit, this company has installed definite production facilities to turn out a large volume of light aircraft engines during 1930.

WARNER

RELUCTANCE on the part of aircraft companies to make large contracts for engine shipment at this time of the year is the experience of the Warner Aircraft Corporation of Detroit, Mich. With the uncertainty that exists in the manufacturers' minds, they are placing orders for engines as they are needed from month to month instead of, as in the past, from year to year.

Due to these conditions, the Warner Aircraft Corporation is planning a minimum production for the year of 500 7-cylinder, 110 hp., "Scarab" engines. They are also planning a minimum production of 250, 5-cylinder, 85-hp., "Scarab, Jr." Should the demand exceed this production, they have the facilities to increase their output as the demand arises.

WRIGHT

THE WRIGHT AERONAUTICAL CORPORATION of Paterson, N. J., are planning for an increase of 15 to 20 per cent over their business in 1929. At the present time they report that contracts are coming in at a satisfactory rate, and the seasonal check-up is under way.

Shipments for the first three months of 1930 have been steadily on the increase, which the company takes as evidence of the fact that aircraft are moving to the ultimate user, and that the manufacturers are becoming more optimistic as spring orders are received. The Wright Co. are looking forward to a good business in their new 575-hp. Cyclone engine during 1930, in addition to the 220-hp. Cyclone on Government order for this year.

They expect to do an approximately even amount of business in the three divisions of their Whirlwind class engines.

GENERAL NEWS

HERBERT F. POWELL, *News Editor*

January Exports Valued at $598,403

Drop in Engine Shipments For January-February 1930

WASHINGTON (D. C.)—Aviation exports in January represented $598,403. Exclusive of Hawaii and Porto Rico, this amount is divided into seventeen planes for $274,189, 25 engines worth $100,748, and parts and accessories, excepting tires, totalling $193,318. Hawaii received one machine at $4,696, one power plant for $800, and parts and accessories valued at $5,760; while Porto Rico was sent one engine for $12,172 and parts and accessories totalling $1,720.

During February, 1930, plane exports had a valuation of $195,750, while during the same month in 1929 the figure for this class was $122,473. Thirty-one machines were exported during the January-February period this year and in 1929, though 1930's consignments were worth $469,939 as against $416,865 in 1929.

Increase in Accessories

The value of parts and accessories sent out of the country during January-February, 1930, was more than double the value of those shipments for the corresponding period last year, representing $339,752 this year and only $162,854 last year. Comparing Februaries of the two years, it is found such exportations were valued at $141,434 in 1930, and $105,756 in 1929.

A decline of approximately 45 per cent in exports of engines for the first two months of 1930 in comparison with the January-February period last year is noted. During 1929, 56 power plants, valued at $277,897, were exported, while only 37 engines, worth $151,461, were shipped this year. In February of this year, twelve power plants, representing $50,713, were exported, while in February, 1929, 23 engines, totalling $116,694, were exported.

A detailed list of plane, engine, and accessory shipments for the month of January, 1930, follows:

Panama, one plane	$6,000
Mexico, three planes	19,735
Cuba, one plane	12,625
Argentina, four planes	46,079
Chile, two planes	71,200
Colombia, one plane	9,550
Peru, two planes	19,000
China, three planes	90,000
Belgium, four engines	15,033
Germany, one engine	4,880
Netherlands, three engines	11,781
United Kingdom, one engine	4,462
Canada, three engines	*523
Panama, four engines	15,977
Peru, three engines	10,692
China, six engines	37,400

The value in dollars of parts and accessories shipped, excepting tires, is given country by country: Belgium $6,412, Germany 2,167, Italy 1,361, Netherlands 6,482, Poland and Danzig 390, Spain 160, United Kingdom 2,911, Yugoslavia and Albania 9,731, Canada 32,128, Honduras 30, Panama 3,586, Salvador 486, Mexico 4,766, British West Indies 326, Cuba 1,982, Republic of Haiti 450, Argentina 9,044, Brazil 9,065, Chile 43,080, Colombia 2,673, Surinam 20,904, Peru 5,429, Uruguay 956, China 18,555, Java and Madura 4,269, Japan 350, Philippine Islands 92, Australia 675, British East Africa 1, Union of South Africa 3,795, French Africa 6,037, Portuguese Africa 25.

*A slight raising of the eyebrows is occasioned by such figures as these—three aircraft engines at $523. However, the Bureau of Foreign and Domestic Commerce states its figures are subject to revision.—ED.

N.A.A. Issues Aero Bibliography

WASHINGTON (D. C.)—National Advisory Committee for Aeronautics announces the Biblography of Aeronautics for 1928, covering aero literature published from Jan. 1, 1928, to Dec. 31, 1928, is ready. As in previous volumes, citations of the publications of all nations are included in the languages in which these publications originally appeared. The arrangement is in dictionary form with author and subject entry, and one alphabetical arrangement. Detail in the matter of subject reference has been omitted on account of the cost of presentation but an attempt has been made to give sufficient cross reference for research in special lines. This book, containing 214 pages, may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at $.50 per copy.

That's How They Test Watermelons

KNOXVILLE (TENN.)—Two Knoxville business men have charged that a Department of Commerce inspector mutilated their private planes while inspecting them. Holes were made in the wings and fuselages of both craft.

Leo C. Wilson, divisional inspector with headquarters at Atlanta, came here to investigate, took photographs of the planes, and sent the prints to Washington accompanied with a report.

"We don't inspect planes that way," he said.

Pennsylvania Operators Form Aircraft Association

HARRISBURG (PA.)—The Pennsylvania Aircraft Operators' Association was formed here March 26 following an all-day conference of more than one hundred aviation enthusiasts called by the State Aeronautics Commission. The meeting especially considered suggestions for regulations now being drafted for aviation schools. A proposal under discussion would require all planes operated in the State to carry their Pennsylvania license number painted in a keystone on the fuselage.

J. Wesley Smith, of Patco Service, Norristown, stated that training courses for student pilots should be thorough since Pennsylvania is full of danger spots for airmen and aviation would be injured by qualifying incompetent pilots.

H. H. Webb, of Altoona Aircraft Corp., took the opposite view saying that if aviation is to expand courses should be arranged so promising aviators of limited means can qualify. He found fault with the requirements of extensive ground equipment and large landing fields. He argued that fields for student fliers should be small to give the inexperienced pilot training helpful in forced landings.

Ray Named President

Officers of the association are: president, James G. Ray, Pitcairn Aviation, Philadelphia; vice-president, Robert Dake, Pittsburgh Airways, Inc.; secretory, Sterling G. McNees, Harrisburg; treasurer, Jennings Love, Air Service, Inc., Johnstown. It is the purpose of the new organization to study aviation's needs in the State, submit recommendations to the State Commission and the legislature, and generally promote aviation activity.

A committee of operators to cooperate with the State Commission was named including Clifford Ball, Bettis Field, McKeesport; R. S. Saltus, Ludington Flying Service, Philadelphia; Jesse Jones, Lancaster; C. D. Griffith, Wilkes-Barre; C. L. White, Bradford; John H. Leh, Jr., Allentown; M. R. Scharff, Greensburg; H. H. Webb, Altoona; and J. Wesley Smith, Norristown.

N-B Orders 50 Switlik Chutes

TRENTON (N. J.)—Switlik Parachute & Equipment Co., this city, announces receipt of an order for 50 parachutes from the Nicholas-Beazley firm, Marshall, Mo. A further announcement states that Stanley Switlik, president, has left for Europe to draft contracts for certain foreign business for which the firm has been negotiating. He is accompanied by R. Taylor, demonstrator.

Bach Flown to a New 2,000 Kg.-100 Km. Mark

LOS ANGELES (CALIF.) — A new world's speed record for planes carrying 2,000 kg. (4409.2425 lb.) of dead weight over a distance of 100 km. (62.1 mi.), was set here March 26 with a Tri-engined Bach transport monoplane flown from the Municipal Airport by Pat Fleming, chief pilot for the Bach Aircraft Corp. The plane was flown twice around a 50 km. triangular course in the time of 26 min. 8 sec. for an average speed of 142.66 m.p.h., or approximately 230 km.p.h.

The former record was held by co-pilots Paillard and Camplan, of France, who flew a Bernard 1-90 plane powered by Hispano-Suiza engines of 600 hp. total, over a closed course between Le Bourget and Goudreville, on November 23, 1928, at an average speed of 223.546 km. or 138.904 m.p.h. The new record exceeds the former mark by 3.756 m.p.h. This record is subject to official check and approval by authorities of the N.A.A. and F.A.I.

The Bach plane with which the record was set is a standard transport model of that company with a wing-spread of 58 ft. and length overall of 38 ft. The plane was powered with a Pratt & Whitney 450 hp. Wasp engine in the nose, and a Wright Whirlwind J 6-7 225 hp. under each wing. Weight of the plane empty was 5,010 lb., and fully loaded for the flight 10,339 lb. Total lifting area, including lift struts used to brace the wing, was 537.4 lb., giving a wing loading of 19.2 lb. per sq.ft. The power loading, estimating the full available horsepower at 900, was 11.2 lb. per hp.

The average speed of 142.66 m.p.h. is slightly lower than the new world's record for seaplanes carrying the same load over an equal distance, recently set at 143.9 m.p.h. by Capt. Boris Sergievsky flying a Hornet-powered Sikorsky seaplane. Fleming's record attempt was somewhat handicapped by high winds and bumpy air conditions.

Glenn E. Odekirk, service manager for the Bach company, rode with Fleming as observer. Joe Nikrent acted as timer, with Gerald Ryder and Ray Nikrent as pylon observers, both timer and observers being official representatives of the N.A.A. and F.A.I. Richfield gas and Richlube motor oils were used in the flight.

Douglas Assets Total $3,283,236

SANTA MONICA (CALIF.) — Total assets of $3,283,236.04 are reported by the Douglas Aircraft Co. for the year ended Nov. 30, 1929. The company has no funded debt and no preferred stock. While earnings last fiscal year amounted to $1.19 per share, the company believes net earnings for the present year should reach $3.00 per share on the 338,692 stock shares outstanding, basing its estimate on unfilled orders on hand. Douglas is producing a new six-place amphibion which is expected to be ready for test flights this month. It will be powered with two Wright J6-9's.

Martin Torpedo Plane Tested in Power Dives

POWER DIVES in the neighborhood of the 6,000-ft. length were completed successfully by William H. McAvoy, N.A.C.A. test pilot, in this new Martin torpedo plane in the recent tests before naval officials at Anacostia, D. C. Starting from the 12,000-ft. level, McAvoy several times hurtled down and pulled out sharply without releasing the 1,000-lb. dummy bomb. A passenger accompanied him in the tests.

Wings experimented with last Fall were found to be insufficiently strong for the long dives with the 1,000-lb. bomb, but alterations materially strengthened them. Although under ordinary circumstances the bomb would be released at the end of the dive, enough reserve strength was built into the plane to enable the pilot to pull out with ease while still carrying the bomb, thus enabling him to try again for his mark as well as protecting him against such contingencies as failure of the release mechanism.

Comdr. J. H. Towers, Acting Chief of the Bureau of Aeronautics, Navy Department, expressed pleasure at the performance of the new Pratt & Whitney Hornet powered torpedo plane.

HIGH POINTS in the NEWS

► *Be-Dieseled exposition.* Industry now bound for Detroit to attend Third All-American Aircraft Show opening Saturday, April 5. Diesel power plant to be initially exhibited in several craft.

► *Worth $598,403.* That figure covers sales of planes, engines, and parts exported during January.

► *Curtain.* Cincinnati's first annual aviation show over after running from March 26-April 1. Features included new Crosley biplane and new Thomas-Morse observation machine.

► *Successful despite distractions.* Buffalo's second annual aero exposition, March 22-30, displaying 27 craft, prospered, they say, regardless of blizzards, zero weather, and murder trial.

► *Ring ceremony.* With an outside diameter of 133 ft., the master ring of the Navy dirigible ZRS-4 is raised into position at the Goodyear-Zeppelin plant.

► *More support.* Interests now identified with the International Zeppelin Transport Co. include U. A. & T., Union Carbide Co., Aluminum Company of America, Goodyear-Zeppelin Corp., and the National City Bank.

► *Bach mark.* Carrying a 2,000 kg. load, a tri-engined Bach transport was flown to a new world record over a 100 km. course by Pat Fleming, Bach test pilot, at Los Angeles. Average speed: 142.66 m.p.h.

► *Largest vs. the Atlantic.* Plan trans-Atlantic flight in Dornier Do.X some time this Summer, with a crew of six and 50 passengers. Route: Lake Constance-Bareclona-Azores-Bermuda-New York.

► *Gas tax trouble.* Boeing pays gas tax in Wyoming but intends to go to court about it, believing law unconstitutional. Following same procedure in Utah.

Airports and Airlines

► *Important merger.* Reports state N. A. T. and U. A. & T. are contemplating a union, which, if consummated, would bring into existence first all-air transcontinental line if present plans of the two companies mature.

► *City airport is liable.* So declares Supreme Court of Alabama in rendering a decision against the Montgomery Municipal Airport in a negligence suit. Hold city is acting in a corporate rather than a governmental capacity.

Curtiss Orders 29 Travel Airs

WICHITA (KAN.)—Travel Air Mfg. Co. has received an order from the Curtiss-Wright Sales Corp. for 29 Challenger-powered biplanes.

Cincinnati Show Concluded April 1

Opened in the Music Hall March 26; Meetings a Feature

CINCINNATI (OHIO)—This city's first annual aircraft show came to an end on April 1, after running since March 26 at the Cincinnati Music Hall. The exposition was directed by George Bodenhoff.

One of the features of the show was the Flight Tutor plane, built by the Aircraft Appliance Co., Springfield, Ohio, which was exhibited by Wright Field. The machine is used for pre-flight instruction of prospective pilots. Another government exhibit was one of the new Thomas-Morse observation planes, outfitted with bombs, machine guns, a radio set, and an aerial motion picture camera. Several other displays also demonstrated craft and accessories used by branches of the government.

The new Crosley single-place biplane, constructed by the Crosley Aircraft Co., Cincinnati, and powered with a Crosley Model 300 four-cylinder in-line engine, was given its first public appearance. Suspended from the auditorium's ceiling was the Aeronca, a craft developed by the Aeronautical Corporation of America. E. L. Hoffman's Triangle parachute was another local product on view.

Other Planes Displayed

Other planes on display included the Butler (Ind.) biplane, a three-place Waco powered by a Franklin automobile engine, the Flamingo all-metal cabin monoplane of the Metal Aircraft Corp., Cincinnati; the Monoprep, of the Mono Aircraft Corp., a Fairchild monoplane displayed by the Embry-Riddle Co., a Cincinnati operating company, and a Waco biplane exhibited by Lunken Airport, Cincinnati's municipal field.

A number of gliders shown included those of the Automotive Trade School of the Ohio Mechanics' Institute and the Northern Kentucky Aero League. The trade school had, in addition, a comprehensive display of power plants and parts.

An elaborate exhibit was that of the Baltimore & Ohio Railroad, occupying an entire side of the south wing of Music Hall, and designated as the "Evolution of Transportation." This exhibit featured full-sized replicas and relics of various transportation media from earliest times to the present.

Many Industrial Exhibits

The more than one-hundred other industrial exhibits included those of the Rainbow Light Co., Hill Auto Body Co., Lunkenheimer Valve Co., Prospect Fire Engine Co., Alemite Company, Crown Overall Co., Aircraft Helmet Co., Cincinnati Aircraft Supply Co., Ogdin Manufacturing Co., The Balsa Wood Co., The Dwight Hinkley Lumber Co., Sohio Gasoline Co., Johnston Motor Co., Cincinnati Underwriters' Co., The Pruess Equipment Co., The Phister Manufacturing Co., Black & Decker Manufacturing Co., C. & D. Auto Supply Co., Aluminum Industries, Inc., Frank Airport, The Kirk & Blum Manufacturing Co., Farrol Paste Co., Central Alloy Steel Corp., The Kendall Refining Co., George D. Wanner Co., D. B. Fowler, The Kelley-Koett Manufacturing Co., Cleresite Company, the Cincinnati Chamber of Commerce Aviation Activities, Cincinnati Automobile Club, and the University of Cincinnati Engineering Department.

The Technical Subject Meetings were held concurrently with the show during its last four days, at the Hotel Sinton, Cincinnati. Among the speakers and their topics were the following: Earl C. Smith, Central Alloy Steel Co., "Aircraft Alloys"; H. N. Willets, Western Electric Co., "Aircraft Radio Communication"; M. T. Clark, Truscon Steel Co., "Hangar Construction Features"; G. A. Richardson, Bethlehem Steel Co., "Aircraft Metals"; P. A. Wright, Thompson Aeronautical Corp., "The New Era of Service"; R. F. Mitten, Black & Decker Mfg. Co., "The Application of Electrical Tools to Aircraft Manufacture"; L. B. Colby, Berry Bros., "Aircraft Dopes and Finishes"; J. H. Allison, The Standard Oil Co., "Fuels"; L. A. S. Wood, Westinghouse Electric & Manufacturing Co., "Airport Lighting"; and Cyrus A. Poole, The Kelley-Koett Manufacturing Co., "X-Ray of Metals for Inspection."

Flying Learned By Women in Day

ROOSEVELT FIELD (N. Y.)—"To show that modern flying is simple," J. G. Orr, manager of Roosevelt Field, recently gave Esther Wagner, stenographer, Dorothy Galbreth, college girl, and Mrs. Helen Gillespie, wife of P. E. Gillespie, flying instructor, a one-day flying course, at the end of which each woman successfully completed a short solo flight. The women were chosen as representing differing ages and occupations.

Although none had actually operated a plane before, all had gained the "feel" of flying through previous trips aloft. All three had less than 7 hr. instruction.

[Satisfactory completion of this one-day course is interesting in that it is the accomplishment of women. There have been several instances of men learning to fly in a day. Back in 1913, Noel Pemberton-Billing, founder of the Supermarine company, learned to fly in that short time following a wager with Frederick Handley Page; and several years later, Kenneth Lane, now chief of the Engineering Department, Aeronautics Branch, soloed after some three hours of instruction.—Ed.]

More Interests Back Trans-Atlantic Company

NEW YORK (N. Y.)—Financial support for the International Zeppelin Transport Co., formed last year for the ultimate purpose of conducting a trans-Atlantic airship service, has been assured, following recent conferences here of various air heads and capitalists.

Interests now represented in the promotion of the company include United Aircraft and Transport, Union Carbide Co., Aluminum Company of America, Goodyear-Zeppelin Corp., and the National City Bank.

Having secured the monetary backing needed, this means that the International Zeppelin concern, chartered last October in the state of Delaware, will now be able to wind up plans and studies remaining to be completed before ships can be built and the cross-ocean route started.

Seek American Base

It is understood that airships for the service will be constructed both here and in Germany and are to be made larger than the Graf Zeppelin. The Goodyear-Zeppelin firm will be unable, however, to commence work on craft for commercial purposes until it has finished the two dirigibles for the United States Navy.

Dr. Hugo Eckener, head of the Zeppelin Luftschiffbau of Germany, is now in this country and plans to visit Baltimore and places further south in search of some locality suitable to become the American base of the airship line. He declares that points further north would not be feasible owing to unfavorable weather conditions. Seville, Spain, has been favorably mentioned as the European station.

Commenting on the fact that airplane interests are involved in this new venture, Dr. Eckener said: "This is of particular importance to me because it means that the airplane and airship, long regarded as competitors, through two of their greatest companies are joining in a co-operative enterprise."

Name Those in Recent Agreement

The most recent agreement was entered into by Charles E. Mitchell, chairman of the National City Bank board of directors; Dr. Hugo Eckener; Col. E. A. Deeds, chairman of the executive committee of U. A. & T., and chairman of the board of the International Zeppelin Transport Co.; P. W. Litchfield, president of the Goodyear Zeppelin Corp., and also of the International Zeppelin firm; F. W. von Meister, of the Maybach Motors Company of Germany; and other important officials.

New Stock Offered By Schlee-Brock Firm

DETROIT (MICH.)—Schlee-Brock Aircraft Corp., Lockheed and Bach distributor in this section of the United States, is offering a new stock issue of 75,000 shares of class A no par common, and 75,000 shares of class B no par common, priced at $10 per unit, a unit comprising one share of each class stock. The purpose of the new corporation, Edward F. Schlee said, is to organize a strong sales organization and to carry on development work on property now owned.

It is the plan of the company to operate an aviation school under the direct supervision of William S. Brock. The firm some time ago completed erection of an up-to-date hangar, 120 x 80 ft., adjoining Detroit City Airport, while a new service and machine shop building, 140 x 52 ft., is now being built. In addition to this property, which lies at the north end of the airport's north-south leg, the corporation owns property at the west end of the east-west leg, fronting 672 ft. on the airport proper and 192 ft. in depth.

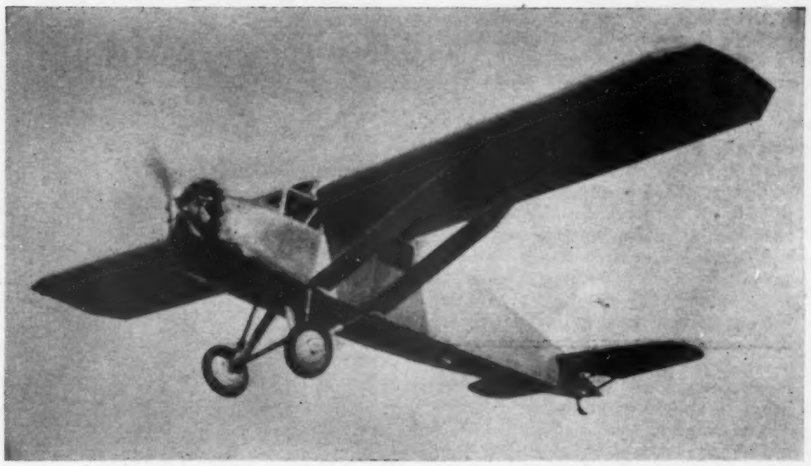
Schlee-Brock is also completing arrangements for assuming the sales franchise for a light training plane manufactured in Michigan. An announcement concerning this is expected to be made during the Detroit Show, April 5-12.

Under the new financing plan the company will have an authorized capitalization of 100,000 class A shares and 250,000 class B shares, 250,000 shares of the total being outstanding. One-hundred thousand shares of class B will become treasury stock. The Fidelity Trust Co., Detroit, has been named transfer agent and the Detroit & Security Trust Co., registrar.

More States Approve Riders

WASHINGTON (D. C.)—Four more states have approved the use of insurance riders excluding risks incurred in aviation. Deputy Attorney General Harold D. Saylor, Pennsylvania, states that Pennsylvania insurance commissioner Matthew H. Taggart has the right to approve such limiting clauses. Provisions providing that except in the case of a fare-paying passenger, aviation accidents shall only necessitate payment of the policy's reserve, are sanctioned by North Carolina and Arkansas. Though opposed to restrictive riders, North Carolina, through state insurance commissioner Dan C. Boney, declares the rights for such solely concern the insurer and insured. Virtually the same opinion is held by W. E. Floyd, state insurance commissioner of Arkansas. State superintendent of insurance for Kansas, C. F. Hobbs, has announced he will approve the use of policy riders freeing insurance companies from aero risks, except to the extent of paying the reserve if death is due to a mishap in an aeronautical endeavor.

Clarence Chamberlin's New Cabin Plane Tested



TEST FLIGHTS were recently conducted at the Jersey City (N. J.) airport on the Crescent Model C-81 cabin monoplane developed by the Crescent Aircraft Corp. The C-81 has accommodations for eight persons and is designed for either the Wright J6-9 or Wasp Junior engine.

The plane's span is 48 ft. and the overall length 28 ft. 11 in. Weight empty is 2,340 lb. and gross weight is 4,440 lb., giving a useful load of 2,100 lb. which provides for 100 lb. of baggage, 100 gal. of gasoline, and 10 gal. of oil.

Officers of the Crescent firm are Clarence D. Chamberlin, president; William A. Hartig, vice-president; Donald L. Sargent, treasurer; John Riley, secretary; and D. Earle Dunlap, chief engineer.

Air Associates to Concentrate

NEW YORK (N. Y.)—Eastern activities of Air Associates, Inc., will be concentrated at Roosevelt Field, L. I., where the company's service hangar, repair station, warehouse, and general offices are now located. Effective April 30, this will mean the closing of the office now maintained at 535 Fifth Avenue, this city. Officials state this move is in line with an accessory sales program to be carried out under the direction of H. B. Page, secretary and treasurer, and for which an appropriation has been voted.

Curtiss and Keystone Get Air Corps Contracts

WASHINGTON (D. C.)—Contracts for planes and engines have been let by the Army Air Corps to the Curtiss Aeroplane & Motor Co., Buffalo, N. Y., and the Keystone Aircraft Corp., Bristol, Pa.

The Curtiss firm will furnish 50 A-3B attack planes, 100 engines of the D-12-E type, and spare parts, which order is worth $1,200,000. Work will be begun on the products immediately and first deliveries will take place in April, it is stated.

Seventy-three Hornet-powered Keystone bombers, spare parts, and engineering data are to be furnished by the Keystone company for a total cost of $2,208,137. The money for these contracts is to come out of the Air Corps appropriations for the fiscal year ending June 30, 1930.

Wyoming Gas Tax Protested By Boeing

SEATTLE (WASH.)—Though Boeing Air Transport paid the four-cent per gallon gas tax on gasoline bought in Wyoming during February, it was done under protest, officials declare, and the matter will be taken to court.

Provisions covering interstate commerce, contained in The Constitution, are said to be violated through this gas tax. It was announced in AVIATION last week (p. 650) that Boeing had started a similar suit in Utah. Furthermore, because of the Nebraska law, which does not exempt aviation gas from taxation, Boeing may locate its Omaha field on the Iowa side of the Missouri River. It is claimed such a move would save the company $6,000 a year.

More agitation concerning the gas tax on aviation fuel has been started by the Phillips Petroleum Co., Bartlesville, Okla. According to the president of that company, Frank Phillips, either a uniform charge should be adopted and the money spent exclusively on airway and airport improvements, or aviation should be entirely exempted from the tax.

Begin Chevolair Production

INDIANAPOLIS (IND.)—Chevolair Motors, Inc., is now in production of 25 of the Chevolair engines. The D-4, four-cylinder inverted air-cooled in-line plant holds type certificate No. 35 and is rated at 90 hp. at 2,000 r.p.m. Arthur Chevrolet is president.

Northrop Officials Describe Low-Wing

LOS ANGELES (CALIF.)—Officials of the Northrop Aircraft Corp., Division of U. A. & T., have released a statement concerning specifications of the firm's new metal six-passenger, low-wing, Wasp-powered cabin plane recently successfully flight tested from United Airport, this city.

The machine is designed to carry the pilot in an open cockpit above and to the rear of the cabin, while the passengers are carried in two rows of three each seated in chairs mounted above each wing beam. The fuselage is circular in section with a maximum diameter of 58 in. The cabin interior in entirely unobstructed by cross bracing, the inside dimensions being approximately 56 in. in width and 54 in. in height.

The engine is carried on a steel tube mount attached to a heavy cast aluminum alloy ring at the forward end of the fuselage, and is mounted in live rubber blocks so that most of the engine vibration is forthwith absorbed. Rubber cushioning is used in many other places throughout the plane, including the mounting of the N.A.C.A. cowling, the aluminum instrument board in the pilot's cockpit, and the insulating of the fuel lines from contact with structural members. The engine is protected from fire by both manual and automatic fire extinguishing systems.

The landing gear has a tread of 8 ft. 6 in. and is equipped with special oleo type shock absorbing struts of Northrop design employing Edgewater ring spring units to carry the load of the plane. Bendix wheel and brake units are standard equipment with Goodrich 32 by 6 in. tires. The rear wheel carries a 10x3 in. Goodrich tire and is equipped with an oleo strut for shock absorption.

General specifications: wing span, 42 ft.; overall length, 28 ft. 2 in.; maximum wing chord, 100 in.; minimum wing chord, 66 in.; mean wing chord, 88 in.; airfoil section, tapered Clark Y; weight, empty, 2,300 lb.; payload, 1,000 lb.; gross weight, 4,200 lb.; power loading, with 425 hp. Wasp, 10 lb. per hp.; wing loading, 14.25 lb. per sq.ft.; total wing area, 295 sq.ft.; normal fuel capacity, 116 gal.; oil capacity, 10 gal.

Check Smith, Haldeman Altitudes

WASHINGTON (D. C.)—Homologation of the barograph carried by Elinor Smith in a J6-9 Bellanca on March 10 reveals she reached a height of 27,418 ft., some three to five thousand feet less than her altimeters recorded after the flight from Roosevelt Field, L. I. However, that mark still exceeds the former woman's altitude record of 23,996 ft. made by the late Marvel Crosson. The Bureau of Standards also announces that Capt. George Haldeman, Bellanca test pilot, reached 30,453 ft. in the same Bellanca at New Castle, Del., on Feb. 28. The altimeters had indicated between 32,000 and 35,000 ft. The official mark, though, is a new height for commercial planes.

Fleet to Open Plant in Ontario

BUFFALO (N. Y.)—Fleet Aircraft Co., Ltd., will shortly open a plant at Fort Erie, Ontario, for the manufacture of aircraft and parts.

Northrop's new cabin low-wing in flight

Approve Driggs and Stearman

WASHINGTON (D. C.) — According to certificate number, make and designation, type, power plant, weight empty, useful load, and gross weight, the following new planes have been granted approved type certificates: No. 303—Driggs Skylark Model 3, two-place open biplane, Rover 75 hp., 878 lb., 501 lb., 1,379 lb.; No. 304 — Stearman 4-C, three-place open biplane, Wright J6-9, 2,256 lb., 1,544 lb., 3,800 lb.

Chevrolet Plans Production

BALTIMORE (MD.)—Chevrolet Aircraft Corp., at present located in the plant of the Glenn L. Martin Co., expects to enter quantity production of its engine some time in June, according to E. C. Burghduff, sales engineer of the company. Since the first announcement of the six-cylinder inverted air-cooled in-line power plant, it has been found that the engine produces 100-110 hp. at 2,000-2,100 r.p.m. rather than the 90 hp. at 2,000 r.p.m. originally estimated, states Mr. Burghduff. [Chevrolet Aircraft Corp. is headed by Louis Chevrolet. The firm should not be confused with Chevolair Motors, Inc., of Indianapolis, of which Arthur Chevrolet is president.—Ed.]

Mexico to Have Eagle Branch

KANSAS CITY (KAN.)—Location of a branch assembly plant of the American Eagle Aircraft Corp. at San Lois Potosi, Mexico, has been arranged through negotiations with Col. Antonio Sea, according to E. E. Porterfield, Jr., American Eagle firm president. Colonel Sea has purchased one Eagle plane and five others will shortly go forward. The Colonel and a company of Mexican capitalists are interested in the assembly plant, which is to be operated separately from the American Eagle company. Initially, biplanes will be produced.

Mid-South Association Elects Haverty President

NASHVILLE (TENN.)—More than 100 aviation enthusiasts from seven mid-southern states held a two-day meeting, March 27-28, at the Peabody Hotel, Memphis, Tenn., and formed the Mid-South Aeronautic Association. The sessions were mainly given over to discussions of problems related to southern aviation and its progress.

The following officers were elected: Maj. Robert Haverty, Memphis, Tenn., president; Anker F. Hansen, Memphis, Tenn., first vice-president; Hayden Brooks, Birmingham, Ala., second vice-president; R. E. Logsden, Memphis, Tenn., third vice-president; John C. Ottinger, Memphis, Tenn., secretary and treasurer.

The association's directors follow: for Arkansas, Morehead Wright, Little Rock; A. G. Williams, Fort Smith, Felix G. Smart, Pine Bluff; for Mississippe, Gus Hawkins, Jackson, W. L. Shelton, Greenville; for Louisiana, John H. Jouett, New Orleans, C. W. Longwill, Shreveport; for Alabama, Sumpter Smith, Birmingham; for Missouri, Capt. George Foster, St. Louis; for Tennessee, W. H. Stoval, Memphis, Judge Albert Williams, Nashville, Horace Houston, Memphis.

Kinner Plans New Financing

GLENDALE (CALIF.)—New financing is planned by officials of the Kinner Airplane & Motor Corp., this city, in order to provide for quantity production of the new Kinner 190 hp. engine, according to the annual stockholder's report recently released by W. B. Kinner, president. Although an official approved type certificate has not yet been issued for the engine by the Department of Commerce, many orders for test purposes have already been received from aircraft manufacturers, it is stated. By the end of May it is expected that the Kinner plant will be equipped to produce 100 of the new power plants per month, in addition to 300 of the K-5 100 hp. models monthly, if the market merits this production. A deficit of $38,905.57 was reported for the year 1929, chiefly due to heavy expenses incurred by the installation of new equipment during the first quarter, and by the failure of some manufacturers to take delivery of engines on order during the last quarter.

Peru to Get Ten Stearmans

WICHITA (KAN.)—Ten special Stearman Training planes have been contracted for by the Peruvian Government states Stearman Aircraft Co. Two Whirlwind-powered Junior Speedmails have been sold to the Department of National Defence, Canada, two Wasp-powered planes of the same type have been bought by Canadian Airways, Ltd., Montreal, and a C-3R Stearman has been ordered by Skyways, Inc., Boston.

"QUOTES"

[Through this column, AVIATION aims to mirror the current thought of the industry as expressed by statements gleaned at will from here and there. Sometimes we shall quote those who know whereof they speak, sometime those who may know, and at times, withal, those who don't know.—ED.]

Television vs. Fog. "In a very short time aviators will be able to fly blind by the projection of rays on a television screen so that the hazards of dense fog encountered in present-day flying will be overcome." — WILLIAM B. STOUT, Stout Air Services, Inc.

Power Sickness. "Today, Germany is a world leader in aviation, and the use and study of gliders has been a big factor in this progress. It is our own fault that we have fallen behind through the overuse of power at the expense of other essentials; more power was described as the general cure-all. The obvious means of catching up is through the development of the glider." —LIEUT. MYRON S. HUCKLE, M. I. T. Aeronautical Staff.

Safer—Then Safest. "More developments are under way and they will all result, I am sure, in that day of the very near future when we can say that aviation is not only as safe as other means of transportation, but far safer than any other means devised by man." —H. B. CROUSE, Crouse-Hinds Co.

Ten to an Engine. "Before the present equipment of airlines is obsolete, a plane that can carry passengers at a profit will be available. I am convinced that it will be a ten-passenger plane with a single engine and a thirty-six passenger ship with multi-engines, using, of course, the smaller planes for comparatively short trips and the larger one for long distant and night flying." —SUMNER SEWALL, The Aviation Corp.

Bonus With Dodo? "Practically all of the large oil companies have discontinued paying pilots bonuses to use their products on endurance and long distance flights. The aviation end of the oil business is getting down to business-like principles just as commercial aviation itself is doing. The same thing goes in the matter of selling petroleum products to airports. The new code of ethics prohibits the giving of bonuses in the form of buildings, pumps, and equipment in return for exclusive gasoline and oil concessions. There is no more reason for such methods in the aviation industry than there is in the automotive field."—A. F. WINN, Skelly Oil Co.

Boeing Building Low-Wing

SEATTLE (WASH.)—Boeing Airplane Co., this city, is bringing out an all-metal low-wing monoplane designed to carry a payload of 2,000 lb. and cruise in the neighborhood of 145 m.p.h. The craft, to carry Hornet power, will be tested in May. Two models of the machine are under way.

Hawks at Tucson in Towed Glider

NEW YORK (N. Y.) — Reports received here as AVIATION goes to press state that Capt. Frank M. Hawks has reached Tucson, Ariz., in the "Eaglet" cabin-glider being towed across the continent behind a Waco piloted by J. D. Jernigin, Jr. Tucson was his first over-night stop, but the third since leaving the starting point, San Diego. Calif., landings having been made at Yuma and Phoenix, Ariz. Hawk's flight is sponsored by the Texas Company of whose aviation department he is head. Accompanying Jernigin in the plane is Wallace Franklin, who aided his brother, Prof. R. E. Franklin, in the design and construction of the Eaglet.

Try Hocke Wing Tips On an S-56 Amphibion

NEW YORK (N. Y.) — American Aeronautical Corp., builders in this country of Savoia-Marchetti aircraft, has equipped one of their S-56 amphibions with Hocke wing tips. These tips are the invention of Prof. Hans Hocke, former director of the Aircraft Experimental Section of the Czecho-Slovakin army. They are attached, or rather built in, at the ends of the upper wing only, and, in contrast to the earlier Hocke tips, are rigidly attached instead of controllable from the cockpit.

In principle, the Hocke tip is much the same as other large dihedral tips which have been tried with varying degrees of success. In one point it differs radically. Instead of merely giving the wing tips a bent up effect, the Hocke tip increases the dihedral in such a way that the chord line of the upturned portion is upward and away from (instead of parallel to, as before) the chord of the main wing section. It is claimed that this increases stability.

Tests have been conducted by Peter Talbot, of the American Aeronautical Corp., and the tips have been found to act as side slip and spin preventives.

The Hocke stabilizing surfaces have been adopted by the Czecho-Slovakian Government for military training planes.

U. S. Flying Club Information Asked

In order to complete its file of flying club organizations in the United States, AVIATION would be happy to be supplied with the names of clubs, names and addresses of the principal officers, and a short jotting of the plan and progress of the group. Similar information regarding glider clubs is also desired. Responses may be addressed to the Editorial Department, AVIATION, 475 Tenth Ave., New York City.

ZRS-4 Master Ring Raised Into Position

AKRON (OHIO) — Something new in dirigible construction was accomplished when engineers of the Goodyear-Zeppelin Corp. raised the master ring of the Navy dirigible ZRS-4 into position at the Akron airdock. The work was completed March 23, following a long period of painstaking preparation.

The ring is the first of twelve such units of the ship's framework to be placed in position. It has an outside diameter of 133 ft.—about twelve stories in height—and an inside diameter of 120 ft. It is 10 ft. wide at the circumference. In cross section, it is triangular. Two tons of duralumin girders, rivets, and other parts were used in building it.

The ring was constructed on the floor of the airdock in a horizontal position. Such rings for other airships have been made in a similar manner, but in all past work it was necessary to build a special cradle in which to tilt the ring on its edge and place it in position. This was because former rings have not been strong enough to support their own weight. But the new-type ring is so constructed that it is self-supporting. Therefore, Dr. Karl Arnstein, the engineer in charge of constructing the airship, decided to lift the ZRS-4 ring into place without the use of a cradle, thereby saving a large amount of money.

Extensive Preparations Necessary

The master ring, assembled at the southern end of the airship dock, was lifted from the floor by an electric crane running 200 ft. above the floor, and was tilted on edge. Then, almost inch by inch, the ring was carried two-thirds the length of the dock and placed on a special steel framework that corresponds to the ways of a surface ship.

Actual moving of the section started Saturday morning, March 23, and was not completed until Sunday. The engineers continually made measurements of the stress imposed on various parts in order to determine just how the ring was withstanding the ordeal. In this way, they learned much about the strength of the unit and the efficiency of their raising methods. After the work was done, Dr. Arnstein declared that the ring had stood up perfectly under every test.

In German ships built in the past, most of the rings were of equal size. This permitted them to be placed with the aid of one cradle for all. But the American type ships, being cigar-shaped, would require a separate cradle for each ring, the expense of which would be enormous.

To Complete Frame This Summer

It has been announced that the remaining eleven main rings, as well as the intermediate stiffening rings, will be placed as was the key section.

The ZRS-4 is to be ready for flight in about a year. The framework, it is expected, will be ready this summer.

Second Buffalo Exposition Closes

Drew Some 30,000 Persons, 27 Craft, from March 22-30

BUFFALO (N. Y.)—Even with zero weather, blizzards, and a front-page witchcraft murder trial as distractions, this city's second annual aviation exposition, held March 22-29, nevertheless claims honors as a success.

Twenty-seven different makes of planes were displayed while 28 craft, representing eight different types, were reported sold at the show for a total approximating $122,875. Up to Saturday noon, March 29, 25,243 cash customers had checked in and it was believed this number would better 30,000 by midnight Sunday.

The machines announced as sold include five American Eagles—three biplanes and two monoplanes—for $30,000; two Eaglerock gliders, sold by Becker Flying Service, this city, for $750; one Fleet Training plane, sold by Kenny Flying Service, Buffalo, $4,000; five Great Lakes, sold through dealer C. Dallas, Inc., Buffalo, for $15,750; one Monocoupe and six Lycoming-powered Stinsons, sold through the same dealer for $38,375; two Travel Air biplanes, sold through Wright & Esenwein, Buffalo, for $9,000; and Six Wacos — three Kinner-powered and three with Warner engines—sold for $25,000.

Elinor Smith Official Hostess

Among displays which attracted considerable attention were the wind tunnel machine shown by Curtiss-Wright Flying Service, and the Link Trainer, a cockpit on a swivel and spring base, exhibited by Charles Dallas. Several spectators tried their luck on the trainer at "keeping horizon."

Elinor Smith, who had one of the show-days named in her honor, was present during the entire week and acted as official hostess. Among the speakers at show meetings was William B. Stout, designer of the Ford tri-engined planes. He addressed members of the Aero Club, sponsor of the exposition, and the Buffalo branch of the Society of Automotive Engineers. Other prominent aviation personalities who attended the exposition included C. S. "Casey" Jones, who spoke before a group of boys comprising the first Eastern Junior Aeronautical Convention; Roger Q. Williams, Eddie Stinson, Clarence Chamberlin, and Count Vladmir Sayamoff, a Russian ace.

Mercury Plane a Drawing Card

One of the craft exhibited at the show was the Mercury parasol monoplane, of the Mercury Aircraft Corp., Hammondsport, N. Y. It's lack of a stabilizer intrigued visiting pilots and manufacturers who gathered to inspect the machine whose entire horizontal tail service was composed of elevator equipment.

Called "The Evolution of Travel," an exhibit featuring everything from a horse and buggy to one of the latest types of planes drew many interested onlookers. The Buffalo show was managed by Byram Waterman. (A list of exhibitors was printed in AVIATION last week, p. 650.)

Deliver 37 Army Boeing P-12's

SEATTLE (WASH.)—Boeing Airplane Co. has made delivery of 37 Wasp-powered P-12 single seat Army pursuit planes, the machines being flown by Selfridge and Rockwell Field pilots from the Seattle factory to Mather Field, Sacramento, Calif., where the Army Air Corps maneuvers are now being held. These deliveries are part of an order of 90, all of which will be delivered prior to May 15 under a speeded-up production schedule to meet the request of the Army.

Shaffer Fuel Company Now Deep Rock Oil Corp.

TULSA (OKLA.)—Announcement that the name of the Shaffer Oil and Refining Co. has been changed to Deep Rock Oil Corp. is made by John L. Gray, vice-president and general manager. The corporation will continue as a unit of the Standard Gas and Electric Co. system.

Subsidiaries of the Shaffer firm, which include the Home Oil Co. (operating in Minnesota, North Dakota, and South Dakota), the High Test Oil Corp. (Oklahoma and Arkansas), and the Deep Rock Oil Co. (Wisconsin and Michigan) have been operating under their individual names as marketing and distributing units. However, the corporate status and names of these concerns are also being changed inasmuch as they are a part of the Deep Rock Oil Corp.

Addition of ethyl fluid to an aviation-quality high compression gasoline is among the latest developments of Deep Rock. The firm, which operates a Fokker Super-Universal, is continuing tests of the effect on fuel and oil of varying climatic conditions in both cross-country and short flights. In addition to using the plane for experimental purposes, Deep Rock also uses the machine for transportation of company executives.

Air Section for Canadian Body

MONTREAL (QUE.)—In order to maintain the policy of the Engineering Institute of Canada as being representative of all branches of engineering work in Canada, the executive committee of the Montreal branch has approved an application for the formation of an Aeronautical Section. J. L. Busfield, B. S., has been appointed chairman, and Prof. C. M. McKergow, Department of Mechanical Engineering, McGill University, has been appointed first vice-chairman. The inauguration meeting will be held on April 8.

Bendix Net in 1929 Was $3.53 Per Share

CHICAGO (ILL.)—In its annual financial report, Bendix Aviation Corp. announces that as of Dec. 31, 1929, total current assets amounted to $25,573,141 against current liabilities of $3,542,312, while total assets were $70,986,235. Cash, call loans, and marketable securities totaled $18,002,528.

Net income for 1929 after all charges and taxes amounted to $7,416,408, equivalent to $3.53 a share on 2,097,454 shares of common stock. The report of the corporation for the year ended Dec. 31, 1928, including Stromberg Carburetor Co., Eclipse Machine Co., Scintilla Magneto Co., and their respective subsidiary companies, showed a net income of $6,166,045 equal to $4.44 a share on 1,390,000 shares of capital stock.

Following is a detailed financial summary:

Consolidated Income Account

For years ended Dec. 31	1929	1928
Gross profit after cost of sales	$12,765,769	*$7,990,923
Other income	1,891,399	.....
Total income	$14,657,168	$7,990,923
Prov. for depn.	767,476	795,165
Sell. gen. & admin. exp.	4,956,087	.....
Int. & misc. exp.	596,243	191,622
U. S. & Can. inc. taxes	920,309	838,091
Minority interest	645	.....
Net income	$7,416,408	$6,166,045

*After general and administrative expenses.

Consolidated Balance Sheet, 1929

Assets

Cash	$6,761,073
Call loans	9,870,000
Marketable securities	1,371,456
Notes & accts. rec.	2,331,332
Inventories	5,239,280
Total current assets	$25,573,141
Investments	414,382
Misc. r.e. & sundry secur.	452,922
Officer & employ. accts. advances, etc.	330,935
Treasury stock	2,496 605
Plant & equipment	7,984,853
Patents, pat. rts., etc.	33,281,432
Deferred charges	451,965
Total assets	$70,986,235

Liabilities

Accts. payable	$1,106,760
Accruals	526,369
Dividends payable	1,048,697
U. S. & Canadian inc. taxes	860,486
Total current liabilities	$3,542,312
R. E. mortgages	101,500
Res. for contingencies	599,565
*Minority interest	3,229,971
†Capital stock	52,436,356
Surplus	11,076,531
Total liabilities	$70,986,235

*Capital stock and surplus of subsidiary companies (including $1,985,100 for agreed retirement of the class A stock of the Eclipse Machine Co.).

†Represented by 2,097,454 quarter shares.

Test Moth Amphibion

ST. LOUIS (MO.)—A Moth training plane, manufactured at the plant of the Curtiss-Robertson Airplane Manufacturing Co., has been fitted with amphibion gear and was tested at Creve Coeur Lake, near here. Further tests will be made with a view to offering planes of this type to sportsmen.

Edo Gets Group Insurance

COLLEGE POINT (N. Y.)—Under a group insurance policy issued by the Prudential Life Insurance Company of North America, 55 employees of the Edo Aircraft Corp. have been insured for $55,000.

A WAR FLOCK! Nineteen U. S. Army Keystone bombing planes roar over Virginia on their way from Langley Field to California to participate in the air maneuvers on the West Coast.

Aero Branch Studies Student Physical Defects

WASHINGTON (D.C.) — Records of 9,103 flying students over a period of thirteen months have been studied by Dr. L. H. Bauer, Medical Director, and Dr. H. J. Cooper, Assistant Medical Director, of the Aeronautics Branch, in order to determine the importance of physical well-being in the achievement of licenses.

In classifying 7,660 students without physical defects of the 9,103 cases considered, it was found 2,684, or 35.4 per cent, eventually received a pilot license of either the Private, Limited Commercial, or Transport grade.

A group composed of 999 students who could secure all license grades save, due to certain defects, the Transport were 30.3 per cent successful in becoming Private fliers, 303 of them getting at least that far.

Another set of 404 students whose physical impairments were such as to limit their license possibilities to the Private grade, turned out only 75, or 18.5 per cent.

Unfit Seldom Successful

Study was made of a group of 40 persons physically disqualified for all licenses. These, due usually to error on the part of the examining physician or because the student had spent quite some money on a course before being declared ineligible were allowed to try for a private license, but only five succeeded. Incidentally, one of the five was killed immediately after receiving his license, his physical defect undoubtedly causing the fatal accident, it is said. So really only four, or ten per cent in this class, emerged successfully.

These figures are cited as vindication of the fact that Department of Commerce standards are not too strict; on the contrary, Private license qualifications are believed to be too lax. It is also declared that waivers, especially for those who cannot pass the physical examination for a Private license, should not be granted.

Plans call for a further study to determine the effects of specific physical impairments on flying ability. For this purpose, an additional 11,000 cases are to be classified.

To Hold Iowa Tour in June

DES MOINES (IA.) — At a meeting held here March 25, the Iowa Good Will Air Tour Committee designated the week of June 16 as the time for the third annual Iowa tour. The journey will start and finish at the local municipal field, and the itinerary will include fifteen stops. George Yates is chairman of the committee, while K. F. Henkle is secretary and E. C. Linden, treasurer.

Douglas Plans Factory Addition

SANTA MONICA (CALIF.)—Douglas Aircraft Co. of this city, is reported negotiating with the Consolidated Steel Corp. for the erection of an additional unit to the present factory. Increased Army orders which are expected to total approximately $2,000,000 and the entrance of the Douglas firm into commercial production of the Sinbad amphibion are said to require expansion of present plant facilities. Approximately 1,400 persons are on the Douglas payroll at the present time.

Navy Orders Cyclones, Fleets

WASHINGTON (D. C.)—Two orders let by the Navy Department for aircraft and engines have gone to the Consolidated Aircraft Corp., Buffalo, N. Y.; and Wright Aeronautical Corp., Paterson, N. J. Six N2Y-1 Consolidated Fleet planes, costing $35,337.06, will be used at the Pensacola Naval Air Station for training purposes. Wright Aeronautical is to furnish 72 Wright Cyclones, with the horsepower raised from 525 to 575, for a contract price of $527,940.90.

German Aero Leaders Here

NEW YORK (N. Y.)—The following recently arrived here from Germany on the S.S. Albert Ballin: Director Karl Maybach, of the Maybach Motor Works, Friedrichshafen, which firm furnished engines for the Graf Zeppelin; Dr. Otto Merkel, Director of the Luft Hansa; Baron Koenig von Warthausen, who flew around the world in a Klemm Daimler; and Antonie Strassman, a German aviatrix.

Trans-Atlantic Flight In Dornier Do.X Planned

NEW YORK (N.Y.)—Advices received here state the Dornier Do.X is to be flown to New York from Germany sometime in July with a crew of six and 50 passengers. Two geared Curtiss Conquerors of the twelve which are to replace the Siemens Jupiters now used in the Do.X have already been shipped abroad. The use of these power plants will raise the horsepower from approximately 6,300 to 7,200.

Both the Curtiss-Wright Corp. and the Dornier Corporation of America, the latter a subsidiary of the General Motors Corp., will cooperate on this side of the Atlantic to make the adventure a success. Louis C. Huck, an official of the American Dornier firm, has sailed for Europe to aid in completion of the plans on that side for the trip, and also to settle details of contracts for the manufacture of Dorniers in this country.

The route, according to present plans, will be flown in the following hops: Lake Constance to Barcelona, 600 mi.; Barcelona to the Azores, 1,655 mi.; the Azores to Bermuda, 1,821 mi.; and Bermuda to New York, 699 mi.

In discussing the intended Do.X crossing, Dr. Claudius Dornier says: "I wish it clearly understood that this flight is an effort to demonstrate the feasibility of regular trans-Atlantic freight or passenger service in heavier-than-air craft."

It is said that the six pusher engines of the Do.X's twelve presented a cooling problem which will be obviated with the use of the water-cooled plants.

MacReady Tours for Shell

LOS ANGELES (CALIF.)—Flying a Lockheed Sirius lately acquired by the firm, Capt. John A. MacReady, Shell Oil Co. Aviation Department head, is touring the Western states in the interests of the Shell services.

Air Corps Exercises To Feature Photography

WASHINGTON (D. C.)—During the operations of the Provisional Wing around Sacramento, Calif., April 1-24, in which approximately 135 combat planes of the Air Corps will participate, aerial photographic missions are to play an important part.

Special photographic planes will be employed by the Air Corps for observation purposes in daylight operations as well as at night. These missions will bring into play not alone standard photographic observation equipment, but also some experimental types including the Air Corps' latest device—the five-lens camera, the all-seeing eyes of which cover more than thirty thousand acres in one single exposure from an altitude of 15,000 ft. At 20,000 ft., the same camera takes a photograph embracing 400 sq.mi. The resulting picture has the shape of a Maltese Cross and the area covered is 28 mi. by 28 mi.

To Use New Flashlight Bomb

There will be several night photographic missions demanding the use of the Army's latest flashlight bomb, which throws a light equal to 5,000,000 cp. and weighs 35 lb. The bomb is released by the photographer and is suspended under a parachute, which also acts as a reflector. The bomb is usually set to "explode" when it is 200 ft. below and 300 ft. behind the photographic plane. The camera is operated by a photoelectric cell which trips the shutter at the exact moment of the maximum intensity of the flare.

Though it has not been definitely decided, it is also possible that the photographic missions may include some long-distance photographic tests. The Air Corps has had considerable success along these lines. It will be recalled that last summer Capt. Albert W. Stevens, chief photographic expert of the Air Corps, took photographs of Mount Rainier from a distance of about 275 mi. The lens used in this camera is red, but of so dark a shade that to the human eye it appears coal black.

Name Units Participating

Among the various divisions to take part in the exercises are the following: First Pursuit Group, Selfridge Field, Michigan, commanded by Maj. Ralph Royce, 40 pursuit and four cargo planes; Second Bombardment Group, Langley Field, Virginia, commanded by Maj. Hugh J. Knerr, nineteen bombers and one cargo plane; Third Attack Group, Fort Crockett, near Galveston, Tex., commanded by Maj. Davenport Johnson, 28 attack planes and one cargo machine; Seventh Bombardment Group, Rockwell Field, near San Diego, Calif., commanded by Maj. Carl Spatz, twenty pursuit craft, four bombers, and two cargo craft; Ninety-First Squadron, Crissy Field, San Francisco, commanded by Capt. Walter H. Kraus, seven observation planes and one machine of the cargo carrying type.

Issues Four-Language Catalog

NEW YORK (N. Y.)—Written in four languages—English, Spanish, French, and German—a catalog containing the history of planes and engines designed and built by the Curtiss Aeroplane & Motor Co. for military use since 1909, has been compiled by Curtiss-Wright for distribution abroad.

Four Flying Police for Denver

DENVER (COLO.)—An airplane squad of four Denver policemen has been appointed here by Chief of Police R. F. Reed. Patrolmen Paul B. Doty, Charles A. Bruen, William B. Ogle and G. E. Miller comprise the quartet of skycops. Doty and Ogle both have private flying licenses, Miller was formerly in government flying service, and Bruen gained flying experience with the Colorado National Guard.

Work on Wedell Plant Sites

NEW ORLEANS (LA.)—Sites for the factory buildings which are to be erected by Wedell-Williams Air Service, Inc., are being prepared at the airport here. According to plans, commercial, racing, and custom-built craft will be in production before the Summer is over. The firm now operates a daily round trip passenger service between this city and Shreveport.

Report Central Alloy Earnings

MASSILLON (OHIO)—Earnings of the Central Alloy Steel Corp., including Interstate Iron & Steel Co. from date of acquisition, were $6,046,594 for the year 1929. Earnings for 1928 were $4,903,341. The company reports assets as of Dec. 31, 1929, were $95,832,350 as compared with $74,957,318 for the year of 1928.

Bid on Parachute Silk for Navy

WASHINGTON (D. C.)—The following bids have been received by the Bureau of Supplies and Accounts to furnish the Navy Department with 10,000 yd. of parachute silk, white, type A, plain weave; Duplan Silk Corp., $1.075; Cheney Brothers, $1.05; H. R. Mallinson, $1.10; Schwarzenbach, Huber Co., $1.10.

Commercials to Try Kelly

SAN ANTONIO (TEX.)—Ten pilots graduated from commercial schools will be sent to Kelly Field as students in the Air Corps Advanced Flying School in the July class. Training of these men will be in the nature of a test of the adaptability of commercial trained fliers to military aviation.

Plan Canada Travel Air Assembly

MONTREAL (QUE.)—Plans to assemble Travel Airs here are being completed by Continental Aero Corp., Ltd., as demand for them has increased.

NEW PLANES

Work is nearing completion in the Emsco aircraft factory, this city, on a new low-wing monoplane designed by Charles F. Rocheville, chief engineer for the Emsco Aircraft Corp. The machine will have a center nacelle to which the wings are braced and upon the nose of which will be located the power plant fitted with the N.C.A.C. type cowling.

Thoburn Brown, Spokane, Wash., has completed a two-place, all-metal cabin monoplane, the Metalark, weighing 886 lb., and having a wing spread of 20 ft. 6 in., a length of 20 ft. 6 in., and a 150-sq.ft. wing surface . The craft is Velie powered and was recently flown by N. B. Mamer, president of the Mamer Air Transport, Spokane.

Heraclio Alfaro, consulting aeronautical engineer, designer, and builder, is constructing an experimental autogiro in Cleveland, Ohio, in association with the Pitcairn Autogiro Co., of Philadelphia.

By late Autumn, the O'Connor Trans-Atlantic Airways Co., City Island, N. Y., expects to have ready for tests its flying boat which has been under construction since Jan. 15, of this year.

Gliders

Known as the Peel gliderboat, a craft built by the Peel Glider Corp., New York, has been tested at Port Washington, L. I., and plans now call for quantity production of the craft. The gliderboat is built of dural and has fabric-covered wood wings. Charles L. Lawrance, president of Wright, heads the Gliderboat company, while Frederick Peel, designer of the craft, is vice-president.

There has been constructed in the shops of Texas Flying Service, Inc., Fort Worth, a primary glider based on German design and weighing 180 lb. The craft has been granted Texas Glider Permit No. 1, while it has also been identified by the Department of Commerce, reports state. The concern responsible for the machine, which has a length of 18 ft., a span of 32 ft., and wing sections weighing 80 lb. each, plans to produce the glider on a commercial scale.

Budd Firm Making Ribs

PHILADELPHIA (PA.)—The Edward G. Budd Mfg. Co., of this city and Detroit, has entered the aviation field, now being in production on its first order for ribs for airplane wings. These ribs are of stainless steel, electrically welded.

Stinson Paint Shop Burns

DETROIT (MICH.)—An $8,000 fire ruined the paint shop of the Stinson Aircraft Corp., Wayne, Mich., Saturday, March 29. Production, however, is not delayed by the loss.

BRIEFLY

A bill to place Lieut. Alford J. Williams, recently resigned, on the Navy retired list with the rank of Captain has been introduced in Congress by Representative Fitzgerald of Ohio. There has been some opposition to the bill from Naval officials on the grounds that it violates precedents without sufficient reason.

Enough stock of Hydraulic Brake Co. has been deposited in connection with acquisition of control by Bendix Aviation Corp. to assure carrying out of the merger.

Bombing planes will be used to exterminate infected herds of wild horses in Oregon, if the U. S. Army heeds requests of ranchers.

A Peel all-metal glider, which was built at Roosevelt Field, L. I., N. Y., on floats, took off recently from Long Island Sound and remained aloft 7 min., being towed by a motorboat for the first 4 min. In addition to a pilot, it carried two passengers and a total load of 400 lb.

An aviation luncheon will be given May 1 at the Willard Hotel, Washington, D. C., in connection with the annual meeting of the Chamber of Commerce of the United States. Speakers will be F. B. Rentschler, F. H. Russell, W. G. Herron, and Gen. John F. O'Ryan.

A bill to provide a state aviation code conforming to Department of Commerce recommendations will soon be introduced in the Louisiana legislature under the sponsorship of the aeronautics committee of the Louisiana Chamber of Commerce.

An airplane carrying a message from Governor Caulfield of Missouri to Governor Patterson of Oregon over the route of the old Oregon trail will be a feature of the "Covered Wagon Centennial" to be celebrated at St. Louis April 10.

A glider meet was held March 30 at Wichita, Kan., under the auspices of the local N.A.A. chapter.

The Des Moines (Ia.) chapter of N.A.A. has moved into new quarters on the top floor of the Observatory Building.

According to present plans, the race for planes using Cirrus engines, sponsored by American Cirrus Engines, Inc., will consist in circling the United States in daily legs of about 900 mi. Attempts are being made to persuade the sponsors to start and end the race in Detroit instead of New York.

Texas Airplane Corp., Corpus Christie, Tex., has equipped eight planes for dusting and for use of Weeveline, liquid weevil eradicator.

Dallas Aviation School, Love Field, Dallas, Tex., has purchased four Eaglerock training planes and one Eaglerock glider.

Wings Photo Service, St. Louis, Mo., is to make an aerial map of the city to be about 10 ft. square, comprising 250 photographs.

W. P. Thurston Co., Inc., Richmond, Va., has been awarded contract for construction of a storehouse and engine overhaul ship at the Naval Air Station, Coco Solo, Canal Zone, to cost about $240,000.

Pan American-Grace Airways has purchased a Curtiss Kingbird plane for use over the Andes between Santiago and Buenos Aires.

Standard Oil Co. of Ohio has accepted delivery of a Wasp-powered Stinson cabin monoplane.

Knapp Flying Service, Inc., Detroit, Waco distributor for Michigan, has changed its name to Michigan Aeronautical Corp. A.B.C. Airline Corp., Lansing, Mich., has changed its name to Abrams Aerial Survey Corp.

Merrimack Valley Airways, Newburyport, Mass., was scheduled to operate a taxi service and open a flying school April 1.

Schools and Colleges

BOEING SCHOOL OF AERONAUTICS, Oakland, Calif., requires that students taking the limited commercial course must not only pass the tests of the Department of Commerce, but also pass precision tests given by the school.

CONSOLIDATED AIR COLLEGE, Kansas City, Mo., announces that it will open a branch at Trenton, Mo., as the first step in a policy of establishing temporary schools at various neighboring cities whenever a sufficient enrollment can be secured.

GREAT NORTHERN AVIATION SCHOOLS, St. Paul, Minn., has been approved by the Minnesota Department of Education for training students in aviation under the guidance of the department.

KYSOR EAGLEROCK SCHOOL, Niles, Mich., has joined the ranks of schools using gliders in their student instruction work.

MICHIGAN BOARD OF AERONAUTICS has published statistics showing that there are more than 35 aviation schools operating in the state with a total enrollment of approximately 1,005 students, of whom 486 are actually receiving flying instruction.

STANDARD FLYING SCHOOLS, Los Angeles, have inaugurated a course to train flying instructors. Those registering for the course must have 250 solo hours and a transport pilot's license.

THE TAMPA JUNIOR AERO CLUB, Tampa, Fla., will conduct a ground school.

WILMINGTON HIGH SCHOOL, Wilmington, Del., offers classroom study in aeronautics, ground school work on engines, and flight training if the student desires it. The Aero Club of the school has bought and is assembling a glider.

JACKSONVILLE (FLA.) HIGH SCHOOLS will shortly start classes in primary aviation, with W. F. Barnwell and several local fliers as instructors.

TRADE TIPS

It has been reported that

Bids for carrying mails between New Orleans and Pilottown, Quarantine or Port Eads, La., between July 1, 1930, and June 30, 1931, will be received at the Office of the Second Assistant Postmaster General, Washington, D. C., until April 25, 1930.

Sky Spa Co., Inc., operators of an airport at Saratoga Springs, N. Y., wishes to make connections with some company which will use the port for passenger service this summer, particularly to and from New York City during the racing season. Address Jess M. Cavanaugh, 13 City Hall, Saratoga Springs, N. Y.

City of Duluth, Minn., will spend about $70,000 for improvements to the Williamson-Johnson municipal airport. Emil S. Gustafson is city commissioner.

Furniture Capital Air Service, Grand Rapids, Mich., and Battle Creek Flying School, Battle Creek, Mich., are in the market for a number of training planes.

Cushman Flying School, Kalamazoo, Mich., and Burns Flyers, Detroit, Mich., are in the market for parachutes.

National Airways, Inc., Detroit, Mich., is considering installation of lighting equipment at the company airport.

Ransom Field, Traverse City, Mich., will soon build hangars.

Schoolcraft Airport, Manistique, Mich., is in the market for airport equipment.

Tri-Cities Chamber of Commerce, Grand Haven, Mich., wants airport engineers to direct work at Grand Haven Airport.

N.B. Additional information concerning trade possibilities will be found in the column headed "Airport Construction Projects."

New Firms Announced

GOLDEN EAGLE AIRCRAFT, INC., Columbus, Ohio; capital 250 shares no par value stock; by R. O. Bone, Jack Helm, Julia E. Sanders, and Arnold Wright. The company was formerly located at Inglewood, Calif.

HUTCHISON FLYING SCHOOL, INC., Bates Field, Mobile, Ala.; by Dr. M. R. Hutchison, Vincent Schmidt, and Jack Hutchison; to engage in school, passenger, and taxi service.

L. S. AERO MARINE, INC., Bemus Point, N. Y.; capital $60,000; by David S. Dawson, Ralph C. Sheldon, Jr., and Emmet H. Ross; to operate an agency for marine boats and airplanes, and to construct and operate airports.

AMERICAN AVIATION SCHOOL, INC., 116 E. 59 St., New York, N. Y., incorporated under Delaware laws; capital 50,000 shares stock at $10; Max Kahn, president.

PERSONNEL

LOUIS J. KANITZ has been appointed general sales manager of Continental Motors Corp., Detroit, Mich.

ALLAN BOURDON and WILLIAM HAMMOND have been made inspectors for the Aeronautics Branch, and are stationed at Detroit.

OSCAR W. LOEW, recently director of advertising and sales promotion, has been made vice-president of Truscon Steel Co., Youngstown, Ohio, builders of airplane hangars and other products.

HARRY H. BLEE, director of the aeronautics development division, Aeronautics Branch, has been appointed chairman of a committee to present American views in drafting the program of the forthcoming International Aeronautical Safety Congress in Paris. Other members of the committee appointed by CLARENCE M. YOUNG, assistant secretary of Commerce for Aeronautics, are: W. R. ENGART, representing National Aeronautical Association; ADMIRAL H. I. CONE, A.S.M.E.; PAUL BRATTAIN, Aeronautical Chamber of Commerce; DR. GEORGE W. LEWIS, S.A.E. The various organizations represented will submit suggestions to the committee by April 15.

Harry H. Blee

F. M. SMITH, formerly with Moth Aircraft Co., has been named general manager of Buckley Aircraft Co., Wichita, Kan.

MAJ. ROBERT G. ERVIN, formerly vice-president of Curtiss-Wright Flying Service of New England, has been appointed eastern representative of Shell Oil Co.

KENNETH M. RONAN, formerly chief engineer of Stinson Aircraft Corp., has been elected president of the Warrior Aeronautical Corp., Alliance, Ohio, successor to Alliance Aircraft Corp. J. D. CAMPBELL and A. EDWARD KUNZL, also formerly with Stinson, have been made vice-president and secretary, respectively.

FRED W. GARDNER has been elected to the board of directors of Detroit Aircraft Corp.

G. N. WILLIAMS has been made superintendent of Douglas (Ariz.) municipal airport, succeeding B. R. RUSSELL, resigned.

REGINALD I. HEATH, superintendent of Utica (N. Y.) municipal airport, has been appointed to the committee on servicing and storage of the Aeronautical Chamber of Commerce.

R. J. KAY has been appointed sales manager of Pioneer Instrument Co., Brooklyn, N. Y.

ROSCOE F. JAMES has been made a member of the Pacific division of the advisory board of Aircraft Finance Corp. of America.

MILES C. HANSON has been promoted to the position of assistant works manager for AC Spark Plug Co., Flint, Mich.

RAY H. BEEBE has been made manager of Union Airport, Lincoln, Neb., for Sidles Airways Corp.

E. B. HAINES has been promoted to the position of assistant sales manager of Pratt & Whitney Aircraft Co.

W. D. YOUNG has been placed in charge of the newly opened Tucson (Ariz.) office of Standard Airlines, at 9 Pennington St.

B. C. HAWKINS has been appointed superintendent of the Thompson Aeronautical Corp. repair base at Pontiac, Mich. W. E. CLOSE, assistant secretary and treasurer, has been elected to the board of directors, and his position is taken by O. J. GURWELL, former auditor.

RAY G. SPARKS has been made general manager of International Airways, Inc., Curtiss-Wright Field, Dalworth, Tex.

LIEUT. H. T. MCCORMICK has been assigned to Curtiss Aeroplane & Motor Co., Garden City, L. I., N. Y., as Air Corps representative.

MAJ. W. F. CENTNER, superintendent of Port Columbus (Ohio), has been made commanding officer of the 308th Observation Squadron.

WALTER RENZE has been made traffic manager for Universal Division of American Airways, Inc., at St. Louis, Mo.

COL. CHARLES H. DANFORTH, commanding officer at Selfridge Field, Detroit, Mich., has been transferred to Washington, D. C. He is succeeded by MAJ. GEORGE H. BRETT.

Representatives Named

CURTISS-WRIGHT FLYING SERVICE—Southern Illinois Airways, Duquoin, Ill.

DAVIS—Airplane Sales Corp., Chicago, for northern Illinois; Hayes Aviation, Inc., 230 W. Genesee St., Syracuse, N. Y., for central New York; The Warrington Motor Car Co., 2035 17th St., N. W., Washington, D. C., for the District of Columbia, Maryland, Virginia, and North Carolina.

OGDEN OSPREY—Air Transport Sales Co., Los Angeles.

PARKS AIR COLLEGE—Richard Scott, Waxahachie, Tex., for Basque, Ellis, Freestone, Henderson, Hill, and Navarro counties.

PRATT & WHITNEY—Air Associates, Inc., Roosevelt Field, N. Y., authorized service station.

WRIGHT ENGINES—Thompson Aeronautical Corp., Cleveland, has appointed as service and parts dealers: Wright and Esenwein, Buffalo, N. Y., Main Aeronautics, Greensburgh, Pa., and Curtiss-Wright Flying Service, Pittsburgh, Pa.

GREAT LAKES—McCray Flying Service, Erie County Airport, Erie, Pa.; for northwestern Pennsylvania.

KINNER—Aero Corp. of California, Los Angeles, parts and service dealers in Southern California.

FAIRCHILD — Aier Services, Inc., Akron; for Ohio.

AERONAUTICAL CALENDAR

May 27-30	All-New England Air Tour, starting from Springfield Airport, Springfield, Mass.
June 28	Annual R.A.F. Display, Hendon, Eng.
July 20-Aug. 7	International Light Plane Tour, starting from Tempelhof Airport, Berlin-Germany.
Aug. 23-Sept. 1	National Air Races, Chicago, Ill.

EXPOSITIONS

April 5-12	All-American Aircraft Show, Detroit.
April 18-26	Tri-State, Aircraft Show, Convention Hall, Camden, N.J. L. D. Odbner, executive secretary, Hotel Walt Whitman Annex.
April 19-26	Aircraft Exhibition under auspices of Montreal Light Aeroplane Club, at The Stadium, Montreal, Canada.
May 3-10	New York Aircraft Salon, auspices Metropolitan New York Division, Distributor-Dealers Section, Aeronautical Chamber of Commerce, at Madison Square Garden, New York City.
June 28-July 6	Pacific Coast Aeronautical Exposition, Oakland, Calif., Municipal Airport.
July 6	International Transportation Exposition, Warsaw, Poland.
Sept. 6-8	International Aero Exhibition, Stockholm, Sweden.

MEETINGS AND CONFERENCES

April 8-9	S.A.E. Aeronautic Meeting, Detroit, Mich.
May 5	A.S.M.E. conference on economy of maintenance and operation, New York, N.Y.; Fiftieth Anniversary Meeting.
May 14-16	National Conference, Airport Section, Aeronautical Chamber of Commerce, Buffalo, N. Y.
May 19-22	Fourth Annual Technical Aeronautical Meeting, A.S.M.E., Wright Field, Dayton, Ohio.
June 9-12	Semi-annual meeting, A.S.M.E. Detroit, Mich.
July 3-5	Western States Aeronautical Conference, Medford, Ore.
Sept. 1-6	Fifth International Air Congress, under the auspices of the Royal Aero Club; The Hague, Holland.

AIRPORT DEDICATIONS

Apr. 9-10	Troy, Ala., Airport.
April 11-13	Curtiss-Wright Airport, Dallas, Tex.
April 11-13	Oklahoma City, Okla., Airport
April 19	New Bedford-Fairhaven Airport, dedication and meet. New Bedford, Mass
April 19-25	Columbia, S. C., Municipal Airport.
May 27	Turners Falls-Greenfield, Mass.
May 30-June 1	Dedication and Air Circus, Colusa, Calif., Municipal Airport.
May 30-June 1	Dedication and Air Meet, Bowles Airport, Springfield, Mass.
May 31	Abilene, Tex., Municipal Airport.

AIRPORTS AND AIRLINES

Airway Improvement Through West Discussed

SALT LAKE CITY (UTAH)—Official delegates from nine western states attended the second annual convention of the Western States Aeronautical Association here March 25. Improvement and development of the western airways was the chief subject of discussion. J. D. Wood, commissioner of public works for Idaho, chairman of the association, presided.

A spirited discussion followed the address of Edward H. Sharpe, of New York, director of public relations for The Aviation Corp. Mr. Sharpe declared that the crying need today is state aid for airways. There are 14,500 mi. of federal airways now, he said, but he believed this should be greatly increased. The discussion developed over the question as to whether or not the time is ripe for state aid to airways.

Other questions which were considered were: property rights, both on the ground and in the air; enforcement of laws: delegation of powers in local government; interstate and intrastate commerce, its application to the granting of certificates of convenience and necessity, and the co-operation of local, state and federal agencies in the promotion of the industry.

Wisconsin Survey Shows 68 Fields

MILWAUKEE (WIS.) — Approximately $2,500,000 is invested in flying fields and equipment in Wisconsin, according to a survey completed by the Milwaukee Association of Commerce. The survey covered 150 Wisconsin cities and revealed that there are 68 fields, of which fourteen are airports, eighteen are landing fields, and 36 are emergency fields. The two largest and best equipped fields are the Milwaukee County Airport and the Curtiss Airport here, each of which represents an investment of about $500,000, including 1930 improvements. There are eighteen municipally owned fields in the state, 45 privately owned and five provided by the Department of Commerce.

Air Ferries Opens New Line

SAN FRANCISCO (CALIF.)—The Air Ferries, Ltd., of this city, inaugurated an hourly air-ferry service to Vallejo, Calif., a distance of approximately 40 mi., on March 26. Planes leave Pier 5 at San Francisco at 5 min. past each hour, and leave Vallejo on the half hour between 8 a.m. and 5 p.m., the one-way trip taking 15 min. The one-way fare is $3.50.

Pickwick Lowers Rates

LOS ANGELES (CALIF.) — Lower one-way and round-trip excursion rates have been announced by Pickwick Airways over the Los Angeles-Mexicali-Nogales route, effective at once and until June 20. The new one-way fare from Los Angeles to Calexico is cut from $22.45 to $16 and the round-trip fare from $40.40 to $28.80. The Los Angeles-Nogales one-way fare is cut from $49.50 to $40 and the round-trip fare from $81 to $75. Lower express rates through to San Geronimo are also to be placed in effect at once, according to L. S. Neal, general traffic manager.

Alabama Court Holds City Liable in Port Case

MONTGOMERY (ALA.) — Supreme Court of Alabama has confirmed the decision of lower courts that a municipality operating an airport is liable for damages resulting from negligence, since it is acting in a corporate rather than a governmental capacity. The decision was rendered in the suit of William A. Lartigue v. City of Mobile and John R. Peavy, city engineer, for damage to crops on land adjoining the airport when airport drainage ditches overflowed.

The court held that an airport is essentially a part of the city's transportation facilities, rather than a public park or playground, and should consequently be treated analagously with building of roads, etc., in connection with which it has been ruled that a city is acting as a corporation instead of governmentally. The city is therefore liable exactly as a private company would be. The court found no previous ruling on the status of airports by high courts in other states, and this decision is therefore likely to create an important precedent.

W.A.E. Installing Beacons

LOS ANGELES (CALIF.) — Western Air Express officials have awarded contracts and work has been started on the night lighting of the Daggett-Seligman section of the Los Angeles-Kansas City airway. When this work is completed the entire 1,420-mi. airway will be lighted with the exception of the Seligman-Gallup link of approximately 200 mi. Beacons are to be placed over this stretch before the end of the summer. Although installation is by Western Air Express the beacons will be turned over to the government for operation and maintenance when the installation is completed.

N.A.T. and United Merger in Prospect

Move Involves Plan For Passenger Services

WASHINGTON (D. C.)—National Air Transport, one of the pioneer air mail operators, recently announced plans to go into the passenger-carrying business on a large scale about August 1. Close on the heels of this definite announcement came the report that there is in process an effort to effect a merger of the interests of N.A.T. and the United Aircraft & Transport Corp. Such a move, which is reported to be hanging on meetings soon of the boards of directors of the two companies, would be of major importance in the evolution of air transport.

All-air trans-continental route

The proposed combination would bring into being the first all-air transcontinental service, inasmuch as Boeing plans inauguration of a San Francisco-Chicago passenger service this Spring and N.A.T. is planning to begin operation of passenger planes between New York and Chicago this Summer. It would bring under supervision of one company, also, the operation of about 4,849 mi. of airways now being flown over by the two concerns. United already has a close working agreement with the Pan American System, which involves a financial interest, making United one of the most powerful air transport units in the American system. N.A.T. announces that on day flights passengers and mail will be carried together. No passenger flying is contemplated for the night hours. Routes covered will be: New York, Cleveland, Toledo, Chicago; Chicago, Davenport, St. Joseph, Kansas City, Wichita, Ponca City, Oklahoma City, Fort Worth, Dallas; Dallas, Fort Worth, Tulsa, Kansas City, Chicago; Tulsa, St. Louis. On the Tulsa-St. Louis run three schedules for passengers alone are planned.

New Schedules Planned

Planes are schedules to leave New York at 1:30 p.m. and arrive at Chicago at 6:30 p.m. (flying time, 6 hr.). The return trip will start at 11:10 a.m. and is expected to terminate at 6:30 p.m. On the Chicago-Dallas schedule planes are to leave Chicago at 8:30 a.m., arriving at Dallas at 5:30 p.m., and to leave Dallas at 8 a.m., arriving at Chicago at 5 p.m. (flying time, 7 hr.). Three schedules a day are planned for the St. Louis-Tulsa division, leaving each city at 8 a.m., 10 a.m., and 12 noon. Small passengers stations are to be

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AIRPORT CONSTRUCTION PROJECTS

Central

IMPROVEMENT work has been started at the Streator (Ill.) Airport. The field is L-shaped with six runways. Negotiations are under way to acquire 60 additional acres for a rectangular field.

The B. Russell Shaw Co. of St. Louis is preparing plans for an office building for Von Hoffmann Aircraft Corp., of St. Louis, adjacent to the 100x120-ft. hangar recently completed for the company at the St. Louis Municipal Airport.

Improvements for the St. Louis Municipal Airport in the near future include a concrete taxi strip connecting the north end of the apron with a concrete runway, which terminates at the northwest corner of the field.

The Curtiss-Wright Flying Service is reported to have spent about $250,000 in developing its base at the Fairfax Airport, Kansas City, Kan., during its first year of operation just ended.

On March 24, Council Bluffs, Ia., closed reception of bids for a complete lighting system, runway surfacing and drainage installation at its new $80,000 municipal airport.

The 160-acre Dixon (Ill.) Airport is under construction and will be dedicated in the fall. Several miles of the tile drainage system have been installed and a hangar is being built. The field is a gift to the city by Charles Walgreen, the chain drug store operator.

Lincoln, Neb., has received bids on the installation of a water system at the municipal airport. The system will include a pump house costing about $1,200, a water main costing about $850 and a pneumatic pressure system costing about $2,500.

Newark, Ohio, has voted to acquire $20,000 tract for an intermediate field.

East

Construction of the first of several concrete ramps has been authorized by the Glenn L. Martin Co. at Baltimore, Md. The ramp will be 140 ft. long and 40 ft. wide. Seventy feet will be above water and 70 below, the grade being 7 per cent, and the depth of water at the outer end, 4 ft. A concrete road 20 ft. wide will be built from the head of the ramp to the assembly room of the factory, 1,500 ft. away. This equipment is being installed to permit launching of the flying boats now under construction for the Navy.

Two new brick two-story barracks, housing about 295 men have been opened for occupancy at Mitchel Field, L. I. Bids are to be asked soon for the construction of buildings for married noncommissioned officers and for all commissioned personnel now quartered in small frame bungalows.

An airport known as "Sky Spa," consisting of 200 acres with runways measuring from 2,600 to 3,800 ft., has been developed at Saratoga Springs, N. Y. A small hangar has been built.

Considerable expansion of facilities and equipment at the Franklin (Pa.) Airport is planned for the early spring. The improvements include a new hangar, extension of the lighting system and improvement of the runways.

Plans are being revived at Jamestown, N. Y., for a municipal airport. It is proposed to put a bond issue of $50,000 before the voters soon for the purchase and equipment of a modern port.

Oneida, N. Y., is seeking to finance development of a 60-acre tract for a municipal airport.

West

The construction of a new $40,000 administration building will be started soon at Wold Chamberlain Airport, Minneapolis. It will be of two stories, and of brick, reinforced concrete and tile construction. It will measure 40 x 140 ft. On the ground floor will be dining room, kitchen, waiting room, customs office, ticket office and airport manager's quarters. On the second floor will be a weather bureau and radio room, lounge and sleeping quarters.

Fitton & Livergreen, Seattle contractor, has been awarded contract to build a shop building, a warehouse and seaplane runways costing $178,700 at the Sand Point Naval Air Station. The firm is now completing an extensive building contract at the station and will start immediately on the new structures.

Preliminary work on the Vancouver (B. C.) Municipal Airport will cost more than anticipated. It is now estimated that $150,000 will be required for drainage, access roads, runways, sidewalks, etc. A subcommittee is studying the situation.

The site for the new Klamath Falls (Ore.) Municipal Airport has been bought, and bonds totalling $50,000 have been sold to finance construction of the field and hangars. The field is now being cleared by Thomas Phillipson at a cost of $1,450.

A new hangar is being built at Bryn Mawr Field of the Northwest Air Service, Inc., Seattle, for the use of Edward S. Campbell.

Seaplane bases are to be provided this year at Wrangell, Petersburg, and Juneau, Alaska.

Work on runways and hangars at the Springfield (Ore.) Municipal Airport is going forward rapidly. Two 2,500-ft. runways have been graded and are being surfaced with fine crushed rock. Another runway measuring 1,500 ft. in length is being rolled. Construction of a 40 x 60 ft. hangar will be started soon.

South

Metropolitan Air Terminal, a new airport at Houston, Tex., is almost completed. The airport tract includes 800 acres and is located 6 mi. from the city. Only one half of the field has been developed. The balance will be prepared later for lighter-than-air operations.

Landing fields are being established at Fort Stockton, Rockport, and Rosenburg, Tex.

The $25,000 hangar measuring 100x 125 ft., which is being built at Candler Field for the Army, is expected to be ready in June. This building will be rented to the government at $1 a year by the aviation committee of the Atlanta City Council.

A steel frame hangar has been completed at the Hattiesburg (Miss.) Municipal Airport. The tract includes 320 acres and $50,000 is being spent on improvements. Lights are to be installed.

Complete Construction At Abilene, Tex., Airport

ABILENE (TEX.)—Buildings costing $150,000 have recently been completed at the municipal airport here, and the landing field is now ready for use. Formal dedication, accompanied by an air circus, will take place May 31. The work has been done by B. Russell Shaw Co., under the supervision of H. B. Sudekum. Equipment includes a 10,000,000 cp. revolving beacon, green approach lights at the end of runways, white boundary lights, floodlighting for buildings, and three field floodlights. The soil is sandy, and runways have been treated with oil and asphalt.

The administration is a two-story structure. The ground floor comprises waiting room, manager's office, ticket office and rest rooms. The second story is the field manager's apartment. A steel and brick hangar 80 x 100 ft. has been constructed. Like the administration building, it is covered outside with stucco. Adjoining it is a lean-to containing heating plant, offices, shop and transformer room. The airport also has a gasoline and fueling station, and plans are being made for a hotel.

Radio Licenses Granted

WASHINGTON (D. C.)—Licenses have been issued by the Federal Radio Commission to the following air transport companies: Pan American Airways, two licenses for airplanes NC-309N and NC-9670, with modification of licenses for additional frequency of 8,015 kc. for WKDL, Miami, and WMDU, San Juan, P. R.; Western Air Express, modification of construction permit and license for station at Flagstaff, Ariz., and licenses for nine airplanes, with renewal of licenses for thirteen planes; S.A.T. Flying Service, Big Springs, Tex., extension of construction permit for KGUG; West Coast Air Transport Corp., construction permit for stations at Seattle, Portland, and Montague, Calif.; Southern Radio Corp., aircraft license; Nyrba line, three new licenses for aircraft.

P.A.A. Has Blind Flying Training

MIAMI (FLA.)—Several divisions of Pan American Airways are to receive special planes for instruction of pilots in blind flying. Fairchilds having a compartment, equipped with full instruments and controls, located behind the regular pilot cockpit are being used. Machines for Miami and Cristobal are being prepared at Brownsville.

Central and Braniff Operations Changed

FORT WORTH (TEX.)—Operation of Braniff division of Universal Air Lines, and of Central Air Lines, has been taken over by Southern division of American Airways, Inc., subsidiary of The Aviation Corp. Headquarters will be maintained here, and the Southern Division will be managed by the personnel which has been in charge of Southern Air Transport. The latter name will no longer be used, as reported when American Airways was organized in February.

Certain revisions of routes accompany the reorganization, and schedules are still undergoing changes. The most important change is discontinuance of service to Wichita, Kan., on the Kansas City-Tulsa-Dallas line. This makes possible a daylight trip from Cleveland to Dallas, on the following schedule: Lv. Cleveland, 9:05 a.m. (Universal Division); Lv. St. Louis, 1:25 p.m.; Lv. Tulsa, 5:10 p.m. (Southern Division); Ar. Dallas, 8:50 p.m. Universal Division will also continue to operate the St. Louis-Kansas City line, furnishing another connection with Southern Division at Kansas City. In addition, Southern Division operates a shuttle service between Tulsa and Oklahoma City.

W.A.E. Gets Group Insurance

LOS ANGELES (CALIF.)—Announcement has been made by officials of Western Air Express, of the issuance of a group insurance policy covering all employees of the company, including pilots and co-pilots. The insurance was written by special arrangement with the Connecticut General Life Insurance Co. after a thorough check had been made of all operating policies and records of Western Air Express. The official check revealed that Western Air Express planes have flown a total of 4,200,000 mi. without a passenger being injured. The insurance is absolutely unrestricted, each employee, whether an executive, office worker, or pilot, receiving a stated amount in the event of death or total disability. The insurance rates charged are said to be the same as those charged for group insurance in any other industry, and of this amount Western Air Express is paying more than half.

Farman Buys Souther Field

AMERICUS (GA.)—Farman Aircraft Corp., the American subsidiary of the Farman Brothers' company, France, has acquired Souther Field here from the Sumter County Board of Commissioners. Through banking interests backing the firm in this country, it is learned Farman Aircraft plans to build Farmans and operate a Farman-method flying school here under a franchise. Henry Farman is president of the Farman Aircraft Corp.

Fix Rate for Graf Zeppelin Mail

WASHINGTON (D. C.) — Trans-Atlantic mail via Graf Zeppelin was discussed at a recent conference between Dr. Eckener and Postmaster-General Brown. The Postmaster-General said that his department would co-operate in all possible ways with the development of mail service by dirigible. Postage on letters from Lakehurst to Germany on the next trip was fixed at $1.20 per ounce, and $.60 for postal cards. The German government will issue a special stamp for the trip to this country, while the U. S. Postoffice Department will use a special cachet on mail transported on the return journey.

Hearing Is Held On D. C. Port Plan

WASHINGTIN (D. C.)—A favorable report on the Bingham bill to establish a municipal airport for Washington will be made to the full Senate District Committee, it is believed, by the subcommittee which has had the bill under consideration, although a majority of the witnesses who appeared at the public hearing held Wednesday, March 26, were opposed to the site selected. The proposed field would be made up of the present Hoover Field and Washington Airport, in combination with part of the adjoining government Experimental Farm, Columbia Island, and the channel —to be filled in—separating the island from the mainland. A loan of $2,500,000, without interest, would be made by the federal government to the District for the development of the airport, title to which would be held by the federal government. The existing fields have offered to sell their holdings for cost (to be ascertained from their books) plus 10 per cent.

N.A.T.-United Merger

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constructed at Hadley Field, Chicago, Kansas City, St. Louis, Oklahoma City, Tulsa, Fort Worth, and Dallas.

"But for the Watres bill which will make possible the carrying out of the Postmaster General's ideas for the handling of air mail contracts," Col. Paul Henderson states, "these plans of N.A.T. could not have been developed."

Operation of a regular passenger line between Cleveland and New York has been a desirable service all this time but the difficulties involved in the negotiation of the Alleghany Mountains lying across the route have been big factors in the delay in actual promotion of such a line. The mail planes have been flown in the face of great operating difficulties and lessons learned in that field will be of great aid in the operation of passenger planes. This action was spurred on, no doubt, both by the favorable features of the Watres bill and the plan of Stout, working with United, to launch a Cleveland-New York service through New York State this Summer.

Plan to Extend Radio Telephone Experiments

WASHINGTON (D. C.) — Plans are now being made by the Aeronautics Branch for experiments with ground to plane and plane to ground radio telephone communication on the New York-Chicago airway. Satisfactory tests over distances of about 75 mi. in the daytime and 200 mi. at night have already been made on the Chicago-Cleveland route. For this purpose, receiving stations have been established at Maywood and Cleveland. Similar stations will be installed at Hadley Field, New Brunswick, N. J., and Bellefonte, Pa.

One of the purposes of the experiments, according to the statement by Assistant Secretary Clarence M. Young, is to study the utility of high frequencies for radio telephone broadcasting from airplanes in flight. Ground stations will use the regular weather broadcast frequencies of 350 kilocycles at Maywood, 321 at Bryan, and 344 at Cleveland; planes will transmit on 3,106 kilocycles. If the experiments are successful, it is anticipated that a regular system of plane position reporting will be tried.

Aeronautics Branch Forms Radio Committee

WASHINGTON (D. C.)—To determine and define the policies of the Aeronautics Branch on the subject of radio, an executive committee on aeronautic radio has been formed under the chairmanship of Clarence M. Young, assistant secretary of commerce for aeronautics. The new committee will also consider and modify the requirements of the Air Commerce Regulations pertaining to radio equipment for aircraft and airport or intermediate stations.

Other members of the committee are as follows: F. C. Hingsburg, chief engineer, airways division; Dr. J. H. Dellinger, chief of the radio research section; Harry H. Blee, director of aeronautic development; Gilbert G. Budwig, director of air regulation. Frederick R. Neely, chief of the aeronautic information division, is secretary of the committee.

To Oust Airport Objectors

NEW ORLEANS (LA.) — Without a dissenting vote the New Orleans Levee Board has voted to revoke licenses of about 250 camp owners, whose camps extend from the mouth of the Industrial Canal to Little Woods, site of the Levee Board's proposed municipal airport. Owners will be allowed 30 days to move. Action of the board followed efforts on the part of camp owners, who hold their title to the land subject to revocation by the Levee Board, to raise money to fight the airport project because of its conflict with their interests.

E.A.T. Operations Changed to Speed Service

NEW YORK (N. Y.)—A number of operation changes were made on the Eastern Air Transport Miami-New York service by Eastern Air Transport coincidental with the change in schedule April 1. The same plane now is flown through from New York to Atlanta without change at Richmond and, likewise, a plane is flown through from Atlanta to Miami without the previous change at Jacksonville. Pilots are changed at the two airports but the time consumed heretofore in the transfer of mail from one machine to another is saved.

Hereafter Newark Metropolitan Airport will be the northern base for the line instead of Hadley Field. This change, planned for some time to be undertaken when conditions warranted, was hastened by the recent fire at Hadley Field in which four Eastern Air Transport planes were destroyed. The new schedule means that there will be two round trips daily between Atlanta and New York and three round trips daily between New York and Washington. Heretofore the New York-Atlanta line has been operated but once a day and the New York-Washington line twice daily.

The Miami-Atlanta section is to be flown at night, starting April 1. The schedule is as follows:

Schedules Showing Connections
(Standard time each city)
New York–Atlanta

	First Flight South-bound Read Down	Second Flight South-bound Read Down			First Flight North-bound Read Up	Second Flight North-bound Read Up
Lv.	**3:00**	**9:10**	New York	Ar.	5:00	9:30
	3:55	**10:05**	Philadelphia		4:10	8:40
	5:15	**11:25**	Washington		2:50	7:20
	6:25	**12:35**	Richmond		1:45	6:15
	8:25	**2:35**	Greensboro		**11:35**	4:10
	9:20	.....	Charlotte		**10:40**	.....
	10:10	**4:10**	Spartanburg		**9:50**	**2:35**
Ar.	**10:55**	**4:55**	Atlanta	Lv.	**7:00**	**11:45**

Air mail for the Midwest and Far West from cities south of Richmond is flown to Atlanta, then to Chicago, connecting there with the transcontinental route. Above schedule northbound connects at New York with Boston, Canada, Cleveland and Chicago. Mail for South America, Central America and the West Indies is flown to Miami, where it is transferred. Connections are made at Atlanta with routes serving the Gulf Coast and Southwest. Mail for Mexico is routed through Atlanta to Brownsville, Texas, where it is transferred to Mexican services.

Atlanta—St. Petersburg—Miami

Southbound			Northbound
Lv.	5:45	Atlanta	Ar. **11:15**
	7:40	Macon	**11:25**
	10:00	Jacksonville	**9:15**
	11:00	Daytona Beach	**8:05**
Ar.	**1:45**	Miami	Lv. **5:30**
Lv.	11:00	Daytona Beach	Ar. **7:05**
	11:45	Orlando	**6:35**
	12:50	Tampa	**5:30**
Ar.	**1:15**	St. Petersburg	Lv. **5:15**

Connections are made at Atlanta for the North, Midwest, Far West, Southwest and Mexican services.

Transcontinental Extension

Northbound			Southbound
Lv.	**3:30**	Richmond	Ar. **12:37**
		(By train to Washington)	
Ar.	**6:50**	Washington	Lv. 7:10
	7:15	Baltimore	6:40
	8:25	Philadelphia	5:40
	9:00	New York	4:45

Connecting at New York with the night transcontinental service to the Midwest, South West and Far West.

Light face figures are A.M.; **bold face figures are P.M.**

Watres Bill Action Delayed

WASHINGTON (D. C.)—Consideration of the District of Columbia bill and the Tariff bill by the House was expected to delay action upon the Watres air mail bill until the end of this week. It has been placed upon the unanimous consent calendar. Pending the disposition of the Watres bill, the Postmaster General is prepared to provide renewal certificates to air mail operators whose contracts expire May 5.

Airway Briefs

Plans for an airport at Sea Island for Vancouver, B. C., have been approved by the civil aviation branch of the Canadian government.

U. S. Senator George Moses has been appointed chairman of a committee to investigate the proposal to establish an airport on marshland at Hampton Beach, N. H.

Western Canada Airways, operating the Prairie Air Mail, is using six Fokker FXLV and three Boeing 40-B-4 mail planes, with ten pilots.

Passenger fares on the Wedell-Williams New Orleans-Baton Rouge-Alexandria-Shreveport (La.) line were reduced 25 per cent effective March 15, making the fare from New Orleans to Shreveport $22.50.

S. Tuttle has taken a two-year lease on the American Legion airport at McCook, Neb.

Southern Division of American Airways, Inc., carried 1,527 passengers in February, a 300 per cent increase over the average monthly figure.

Russell N. Boardman, president of Boardman Aircraft Co., Boston, Mass., has purchased Hyannis Airport from Charles Ayling.

Installation of teletype printers between Oakland and Portland will soon be completed.

Radio range beacons which can be switched from sending aural to visual reed signals are being tested at St. Hubert Airport, Montreal, Canada.

On one day recently 139 persons arrived or departed from Cleveland Airport, of which 100 were carried by Stout Air Lines, it is reported.

An air mail transfer office has been installed at Pasco, Wash., Airport.

Senator Bingham has introduced a bill in the Senate to amend the Air Commerce Act by a requirement for placing air markings on government buildings when the location is suitable.

Passenger traffic over the Seattle-Portland-San Francisco route operated by West Coast Air Transport increased 150 per cent in February.

Two teletype machines and an anemometer are being installed at Brainard Field, Hartford, Conn.

Reports that the Western Air Express plane lost Jan. 10 between Los Angeles and Salt Lake City contained a fortune in currency and securities have been denied by the Post Office Department.

Passenger traffic over Universal Division of American Airways, Inc., is reported to have increased 300 per cent during the first 30 days of operation at the present low rate, with 3,013 paying passengers as compared with 1,060 during the previous month.

Frank Phillips of Phillips Petroleum Co., Bartlesville, Okla., has addressed telegrams to the governors of all states requesting uniform practice in taxing aviation gasoline, and no tax which is not used for airway development.

Plans for construction of a marine airport at the foot of Georgia St., Buffalo, N. Y., will be one of the first considerations of the newly appointed city airport advisory board, consisting of J. H. Dotterweich, T. C. Jewett, W. T. Jebb, Jr. T. W. Patterson, T. C. Knight.

Officials of Southern Division of American Airways, Inc., and Gulf Coast Airways, Inc., have been conferring relative to expansion of Houston-New Orleans-Atlanta air mail service as a result of new connections to New York and Chicago.

Radio station WQDQ, Menefee Field, New Orleans, La., owned by Gulf Coast Airways, has been authorized to broadcast intercompany communications, weather reports, and ground-to-plane messages, on three frequencies.

Pyle-National Co. has recently completed installation of complete lighting equipment at Kohler Airport, Kohler, Wis. Type 2375 projectors are used.

T.A.T.—Maddux Air Lines report an increase of over 450 per cent in traffic during the first two months after lowering of rates (Jan. 14), as compared with previous monthly averages. Heaviest travel has been over the eastern division.

More than 1,800 gal. of gasoline were sold at Lincoln (Neb.) Municipal Airport in February, and sales since then have averaged 600 gal. per week.

United Airport, Los Angeles, Calif., developed by Boeing System and owned by United Airports Corp., has been designated as the site for the Southern California Army Air Corps maneuvers April 26-27.

New York Airways, Inc., has signed a contract for use of the Atlantic City (N. J.) municipal airport, and plans to inaugurate 1-hr. service between that point and New York City about June 1.

Mid-Continent Air Express has resumed daily passenger service between Albuquerque, Denver, and El Paso.

Col. Arthur C. Goebel left Los Angeles March 24 for a survey of airports between Los Angeles and New York, and in New England, under the auspices of Richfield Oil Co.

Western Air Express is having diagonal stripes of yellow and black painted on the upper wing surfaces of all planes so that they may be located more easily in case of forced landings.

FOREIGN ACTIVITIES

Report European Glider Development

PARIS (FRANCE)—Reports collected here by the U. S. Department of Commerce Automotive Trade Commissioner indicate a rapid growth of interest in the glider movement throughout Europe. In Germany, of course, gliding has been developing steadily for several years, with the Rhon-Rossiten Gesellschaft at Frankfort as the largest organization, supporting glider schools in various different parts of the country, and the Wasserkuppe school a close second. In all of Germany, there are now between 300 and 400 gliders, which cost from $375 to $2,000.

In France, both the University Aeronautics Club and Avia have been organized to encourage gliding, and both assist in the formation of local clubs in various parts of the country. Nearly 700 glider flights have been made during the past six months under the auspices of the University Aeronautics Club alone. The British Gliding Association has recently been formed for the same purpose in England, and associated with it is the London Gliding Club. German gliders have been purchased thus far, but plans for building gliders in England are under way. In Italy, there are no glider clubs, but the Air Ministry maintains glider schools at Pavullo, Genoa, and Rome, where members of the Fascist boy scout movement may receive training. Italian gliders also follow German design, but 100 per cent Italian gliders are now being planned.

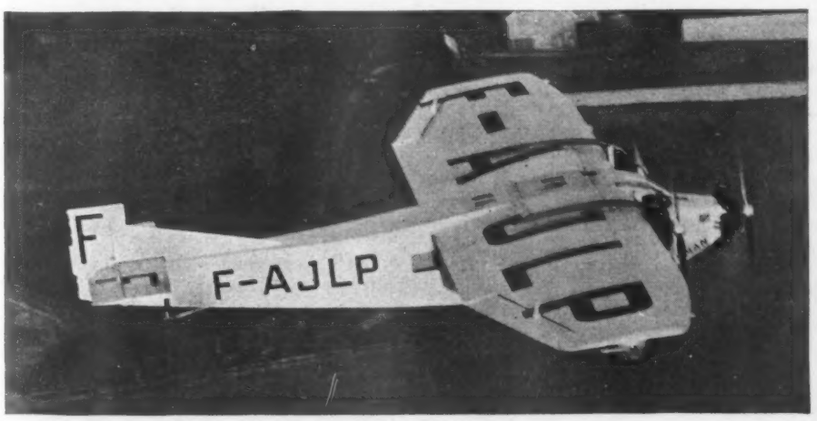
De Havilland Builds Moth Six

LONDON (ENGLAND)—The De Havilland Moth Six has been produced as a refinement of the Hawk Moth, which made its appearance last year at the London Aero Show. This machine is a six-place, cabin monoplane fitted with a Lynx of 240 hp. One of the features of this machine is the transparent roof of the cabin, providing the pilot with excellent upward and backward visibility. As a land plane the machine has a maximum speed of 127 m.p.h. and a landing speed of 54 m.p.h. As a seaplane the machine has a high speed of 123.5 m.p.h. and a landing speed of 54. It may be used as a four-seater as well as six-seater. The Moth III, a lighter version of this, is powered with a Cirrus.

Mexican Line Plans Extensions

MEXICO CITY (MEXICO)—Arrangements for a direct mail and passenger air line between Mexico City and Los Angeles, Calif., are being made by Theodore Hull, president of Corporacion Aeronautica de Transportes. The route under consideration would include intermediate stops as follows: Zacatecas, Torreon, Parral, Chihuahua City, Nacozari, Cananea, El Centro, Nogales, Calexico, San Diego. The company has also recently received concessions from the Mexican government for operation of three new routes: Monterey-Laredo, Tex.; Ciudad Victoria-Tampico (branch line); Ciudad Victoria - Manzanillo; Tijuana - Agua Caliente - Ensenada, Lower California.

Farman Produces Tri-Engined Monoplane



THIS IS THE Farman F.300, the tri-engine version of the Farman 190 cabin monoplane. The F.300 is powered with three Salmsom engines of 230 hp. each, arranged in the nose and under the wing in the fashion well known in this country. The plane carries eight passengers. The single-engined Farman 190 has been quite successful and has been used on a number of outstanding flights to and from Madagascar and other points in Africa in recent months.

Caproni 90 Makes Six Records Carrying Load

ROME (ITALY)—Six new world's records for airplanes with load were established Feb. 22 by Domenico Antonini in the 6,000 hp. Caproni 90, subject to homologation by the F.A.I. The machine made a flight of 1 hr. 31 min. 39 sec., attaining an altitude of 3,231 meters (10,600 ft.), with a load of ten metric tons (22,000 lb.). This broke the records for duration and altitude for machines carrying 7,500 kg., and 10,000 kg.; the record for duration with 5,000 kg.; and the record for greatest load carried to a height of 2,000 meters.

The last two records were previously held by France, having been established in 1925 with a Farman Super Goliath. Up to the present time, no other records for planes carrying commercial loads of more than 5,000 kg. (11,000 lb.) have been recognized, and it is believed that this is the first time such loads have been carried to a high altitude or for an appreciable length of time.

Swedish Lines to be Resumed

STOCKHOLM (SWEDEN) — The Malmoe-Amsterdam service will be resumed on a daily basis by the Swedish company, Aktiebolaget Aerotransport, and the Dutch K.L.M. under co-operative arrangement, it has been announced. The service will be resumed April 7 and continue through Oct. 4. The Swedish company will operate a Stockholm-Helsingfors service daily between May 1 and Sept. 30.

Aeropostale to Try Ocean Flight

PARIS (FRANCE)—The France-South America mail line operated by the Compagnie Generale Aeropostale uses fast cruisers for crossing the South Atlantic. Following recent tests of the new Latecoere 28, eight-place cabin monoplane, equipped with flotation gear, and powered with a 600 hp. Hispano-Suiza engine, Aeropostale decided to make experimental ocean trips with the machine. Such a flight with a single-engined plane appears somewhat hazardous and it is not expected that so long a sea route will be regularly operated with this type of craft.

Sweden Gets Jupiter License

STOCKHOLM (SWEDEN)—Rights to manufacture Bristol Jupiter engines in this country have recently been acquired by the Swedish government, after negotiations in the course of which several private engine manufacturing companies applied for the concession.

Announce Program Of French Air Events

PARIS (FRANCE)—The Sporting Committee of the Aero Club of France has issued a calendar of sporting events for this season as follows:

May 1—Start of second competition for the Zenith Carbureter trophy, closing Sept. 30. This event is open to light planes of the first and second categories, the prize going to the pilot covering a 1,040-mi. tour of France with six compulsory landings over a predetermined route in the shortest time. It was won last year by Captain Broad in a Coupe Moth at a speed of 112 m.p.h.

May 29-June 1—National contest for touring planes under auspices of Aero Club of Herault and Aveyron.

May 31—Dedication of seaplane base at Nevers.

June 1—Dedication of seaplane base at St. Honore-les-Bains.

June 8-9—Annual national air meet at Vincennes.

June 30—Close of second contest for Michelin trophy. This also is a speed event over a 1,735-mi. course through France, with fifteen compulsory stops. It is limited to planes with engines of 230 hp. or less. The first contest was won by M. Detroyat on a Morane-Saulnier 130 monoplane, fitted with a 230 hp. Salmson, at 118.2 m.p.h.

July 31—Close of 1929-1930 competition for the Renault trophy. This is awarded for the best non-stop distance flight in the competition period.

Pickwick Busy in Mexico

MEXICO CITY (MEXICO)—Mexican and Guatemalan services of Pickwick-Latin American Airways from the date of their inauguration, July 29, to Dec. 31 carried 1,377 passengers and 2,437 lb. of mail. During this period the planes in these services flew 335,969 miles. In January 278 passengers traveled over these lines—a 50 per cent increase over December traffic—and 858 lb. of mail were carried. On the Mexican and Guatemalan divisions twelve pilots are employed. All are American.

Plan International Glider Group

BERLIN (GERMANY)—As a result of the first international congress for motorless flying, which was held recently at Darmstadt, the representatives of all the countries interested have decided to combine their activities and form a body under the name of "International Commission for Studies in Motorless Flight."

Plan Air Mail Stamp Exhibit

PARIS (FRANCE)—An International Air Mail exhibition is to be held in Paris, Nov. 6-16. A special official stamp will be issued during the show only and will be sold to visitors in limited quantity. Entries for the exhibition are received until June 30 by the Aéro Club of France, this city.

Private Air Yacht Built by Supermarine

THIS TRI-ENGINED flying boat has been built for the private use of A. E. Guinness, who has done considerable travelling by air in other machines he has owned. A description of this plane was printed in the March 15 issue of AVIATION. It was built by Supermarine Aviation Works, Ltd.

Foreign Briefs

Rate for flying instruction by Phillips and Powis, Reading, England, has been reduced to slightly less than $10 per hour, with a book of vouchers for twelve 15-min. flights selling at $29.15. The school charges no entrance fee or regular tuition.

At Haifa, the new port being developed in Palestine, 500 acres of land have been purchased for use as an airport.

The first flying meet of 1930 was held at Brooklands field, England, March 2, with about 40 planes participating. London Gliding Club also recently held an informal meet near Guildford, with one German glider and one built from an American model, both of the primary training type.

Two suitable terrains for gliding have been found in Belgium: one near Zoute, on the coast, and the other at Kesselberg, near Louvain. Herr Hirth, the German expert, recently made a flight of 1 hr. 3 m. at the latter location, in a Kassel sailplane.

The airship shed at Karachi, India, was completed March 9, and is ready for use by dirigibles if and when proposed flights to India are made.

Louis Coatalen, who is associated with the British Sunbeam Co., is said to have perfected an airplane Diesel engine.

There are at present 100 glider clubs in Germany, 220 gliders and 60 soaring gliders. There are 3,000 class A pilots, 2,000 class B pilots, and 300 class C pilots, the last classification being fully qualified for soaring.

There are now 76 landing fields in French Indo-China, of which 23 have hangars.

A Bleriot seaplane with four 250 hp. engines, cantilever monoplane construction, intended to carry twelve passengers and a crew of three, has recently been flight tested.

Donati has received a silver medal from the Italian government for establishing a light plane altitude record, as has Lombarti for a light plane flight from Rome to Mogadiscio via Tripolis and Eritrea, in northern Africa.

The airline from Genoa to Palermo via Rome and Naples will be operated daily this summer, and the Rome-Genoa-Barcelona and Rome-Brindisi-Athens-Constantinople lines will be operated semi-weekly.

A weather broadcasting station is being erected at Negombo, Ceylon.

Regular night mail service between Brussels and London was to be inaugurated March 15 by Sabena.

A mooring mast for the Graf Zeppelin to be erected near Pernambuco, Brazil, has been shipped from Germany.

German Luft Hansa has protested against an increase in the tariff on gasoline.

Thirty orders for Moth planes have been received by Avions Morane-Saulnier, recently licensed to produce the De Havilland machine in France. The first order was from Captain Costes.

Mlle. Lena Bernstein, holder of the woman's distance record, plans to fly to Japan in a Farman 190 cabin plane.

Experiments with delivery of air parcel post by parachute are to be made in England.

Air races will be held Saturday, April 5 at Reading, England, and it is planned to have races at one or another airport every Saturday during the summer.

Air Marshal Sir Edward Ellington, K.C.B., C.M.G., C.B.E., has been appointed Principal Air Aide-de-Camp to the King of England.

Wibault Building New Scout

PARIS (FRANCE)—The Wibault company is constructing a twin-engined, three-place, night reconnaissance plane of all-metal construction, and designated as type 220 R.N. It is a monoplane with the two-engines slung under the wing on either side of the fuselage on supports running between wing and undercarriage. The pilot's cockpit is just forward of the wing and observation and machine gun posts are in the nose and to the rear of the wing. Jupiter IX engines of 425 hp. each are used. The machine will have a span of about 60 ft.

Off Like a Bird— Swiftly and Smoothly— from a COLAS *Runway*

A faultless take-off—speedy and smooth—a short ground ride—into the wind—off in the distance. You find yourself in the air sooner—after covering less ground—when taking off from a COLAS runway.

Although the main airport use of COLAS is in the construction, repair and maintenance of Runways—Hangar Floors, Taxiways, Aprons and Roads within and surrounding the field are among its many other ideal uses.

Uneasiness of mental attitude — the mental hazard in flying—is minimized with COLAS Runways at your local airport. They are MODERN—synonymous with the "Advancement of Aviation."

COLAS is an asphalt cement used to bind together the mineral aggregates used in the construction of the roadbed. It is applied cold—as delivered — thereby eliminating all heating costs and fire hazards.

COLAS surfaces neither "wave" nor "bleed" in hot weather. They will not "wash out" in rainy weather and they are unaffected by frost.

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A completed COLAS runway. Note the smooth, fast and durable surface.

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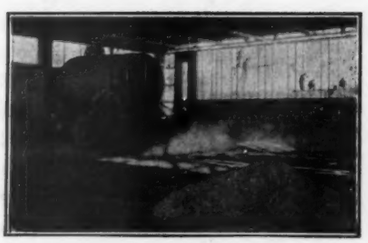

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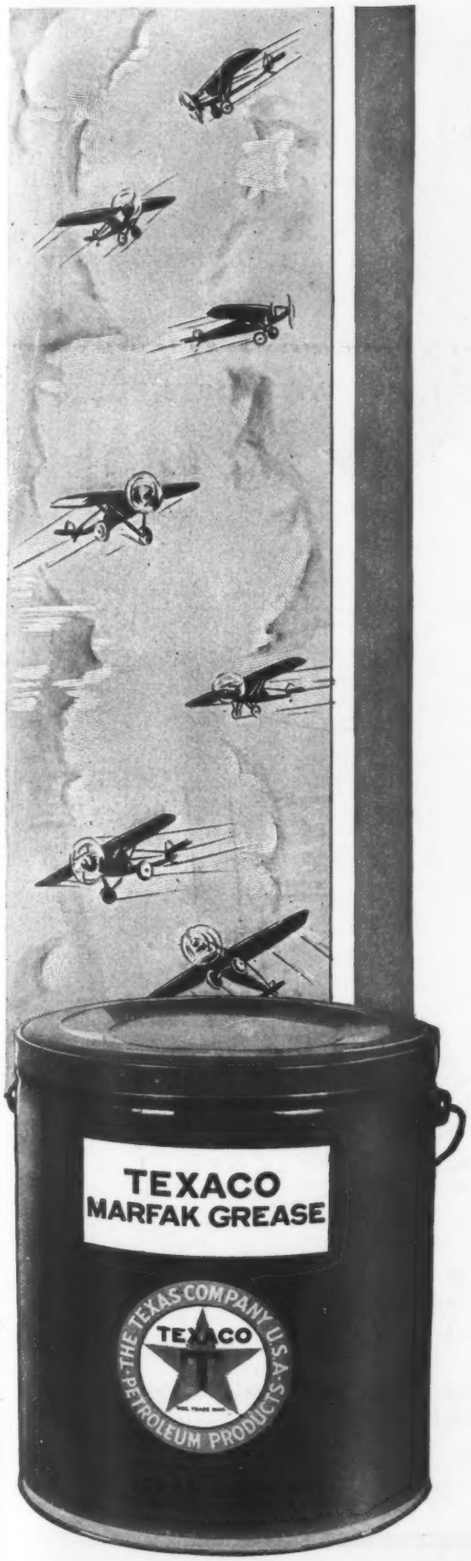

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All the extra attachments needed with the Black & Decker Valve Refacer are a few grinding wheels of different grades—which can be dressed to different shapes, a hacksaw, a file, some emery and crocus cloth, and a bit of common sense to be used by the operator. "

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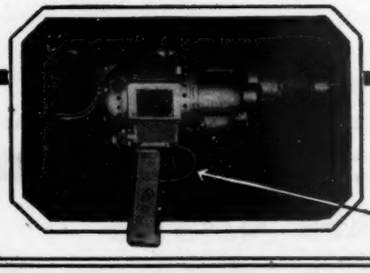

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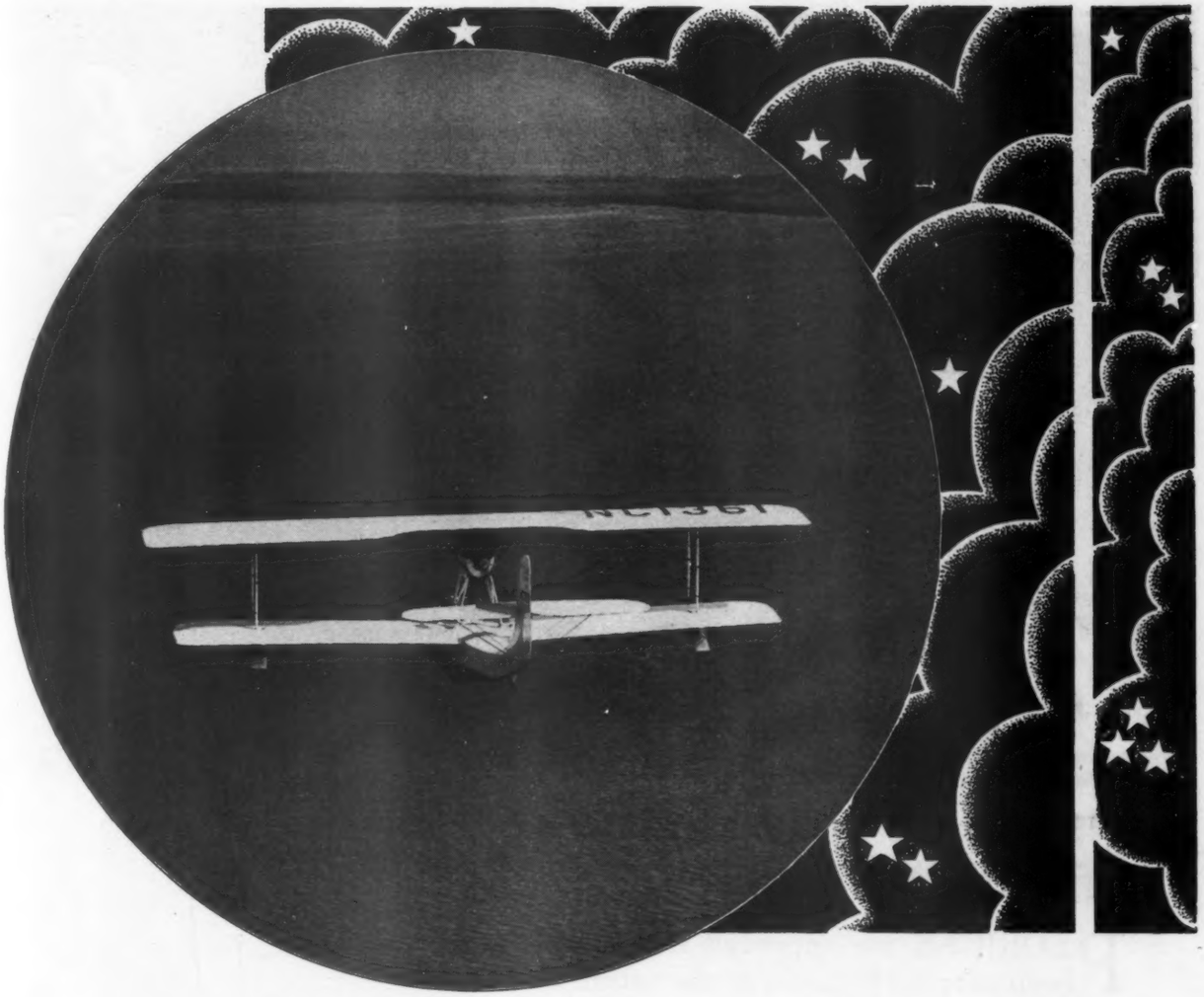

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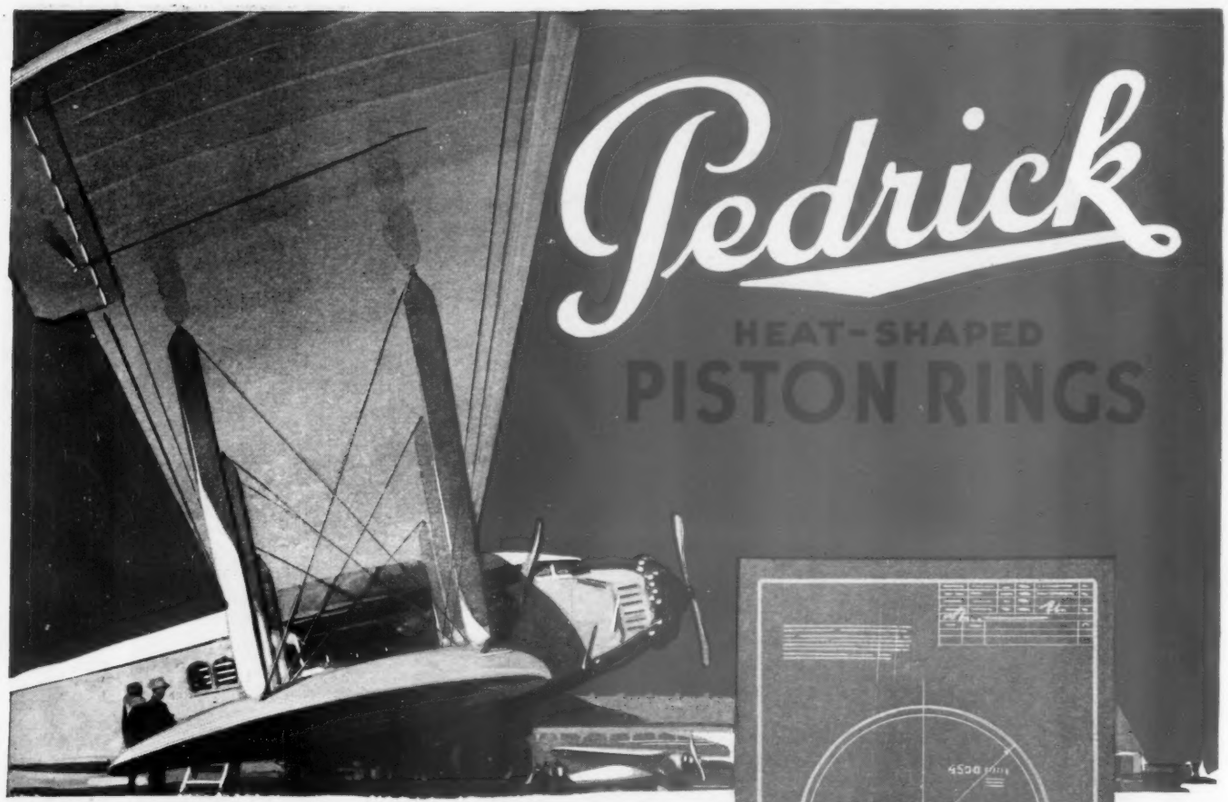

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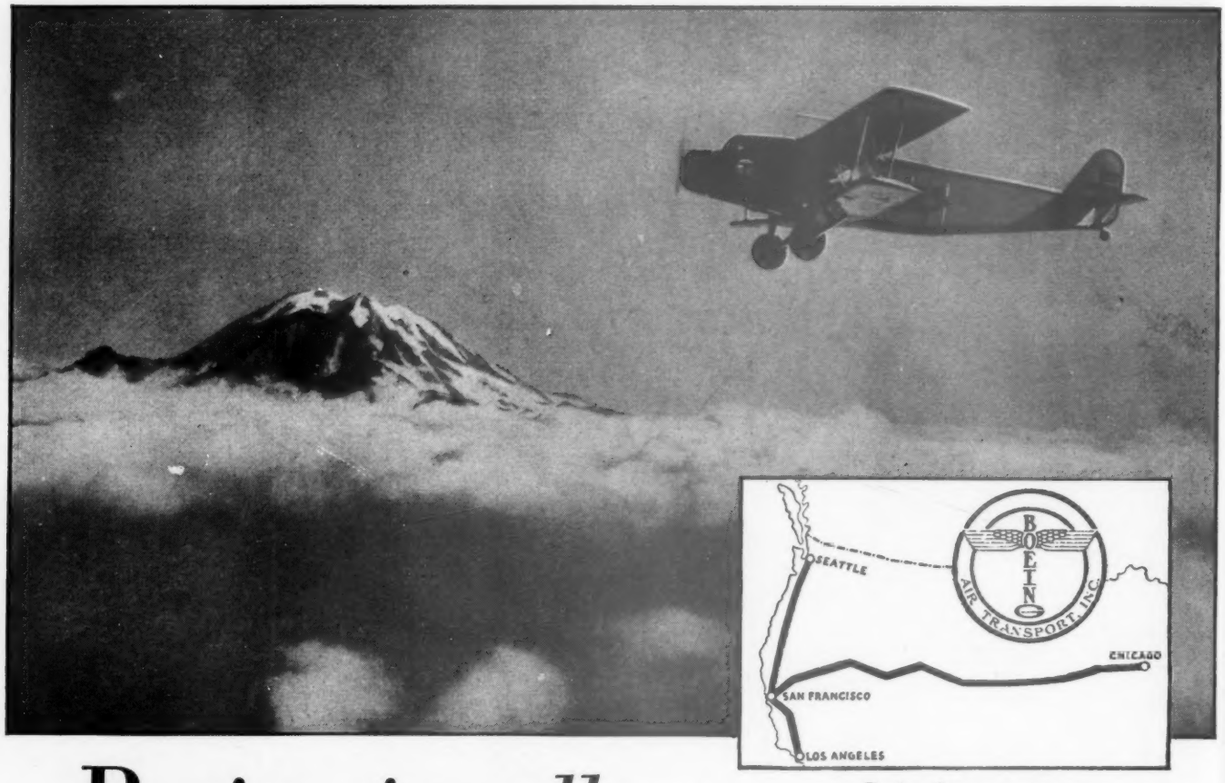
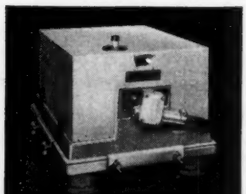


Boeing System routes

Boeing *installs the* Airplane Telephone



9B Receiver

Over the Sierras with Boeing, clouds hiding all but the highest peaks. "Weather clear, ceiling 3500 feet at Sacramento," comes a reassuring voice from far ahead.

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Western Electric radio telephone equipment plays an important part in making Boeing service reliable. Forty-eight mail and passenger planes are fitted for two-way telephone communication with the company's eighteen ground stations.

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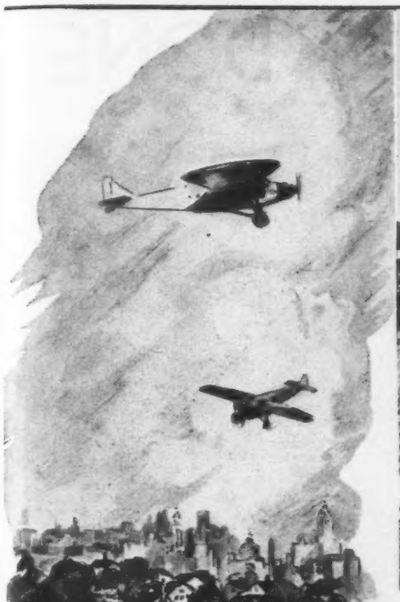

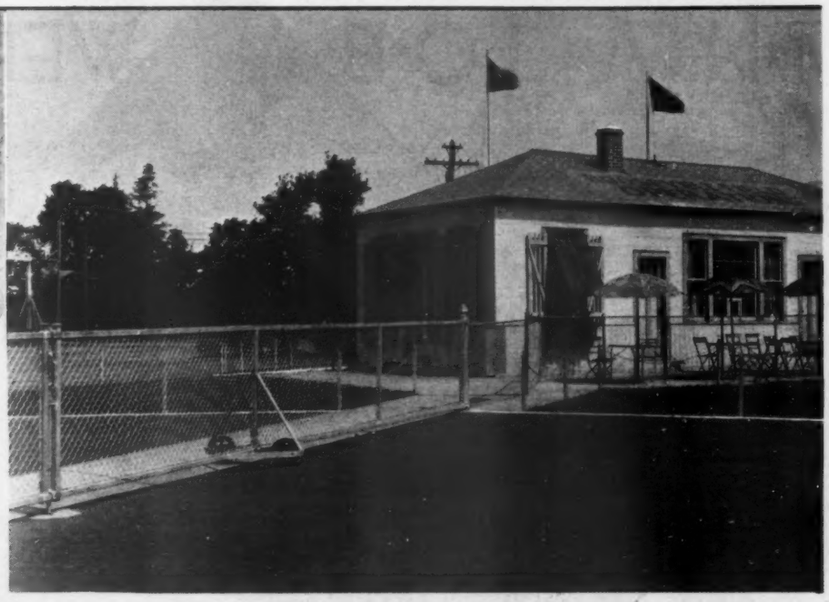

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CONFIDENCE
IN A JOB WELL DONE

"I've been over her from spinner to rudder, and she's O. K. Then, too, I've fueled her with Skelly Aerodynamic Gasoline and lubed her with Skelly Airplane Oil. It's a long run, but that ship will go on through."

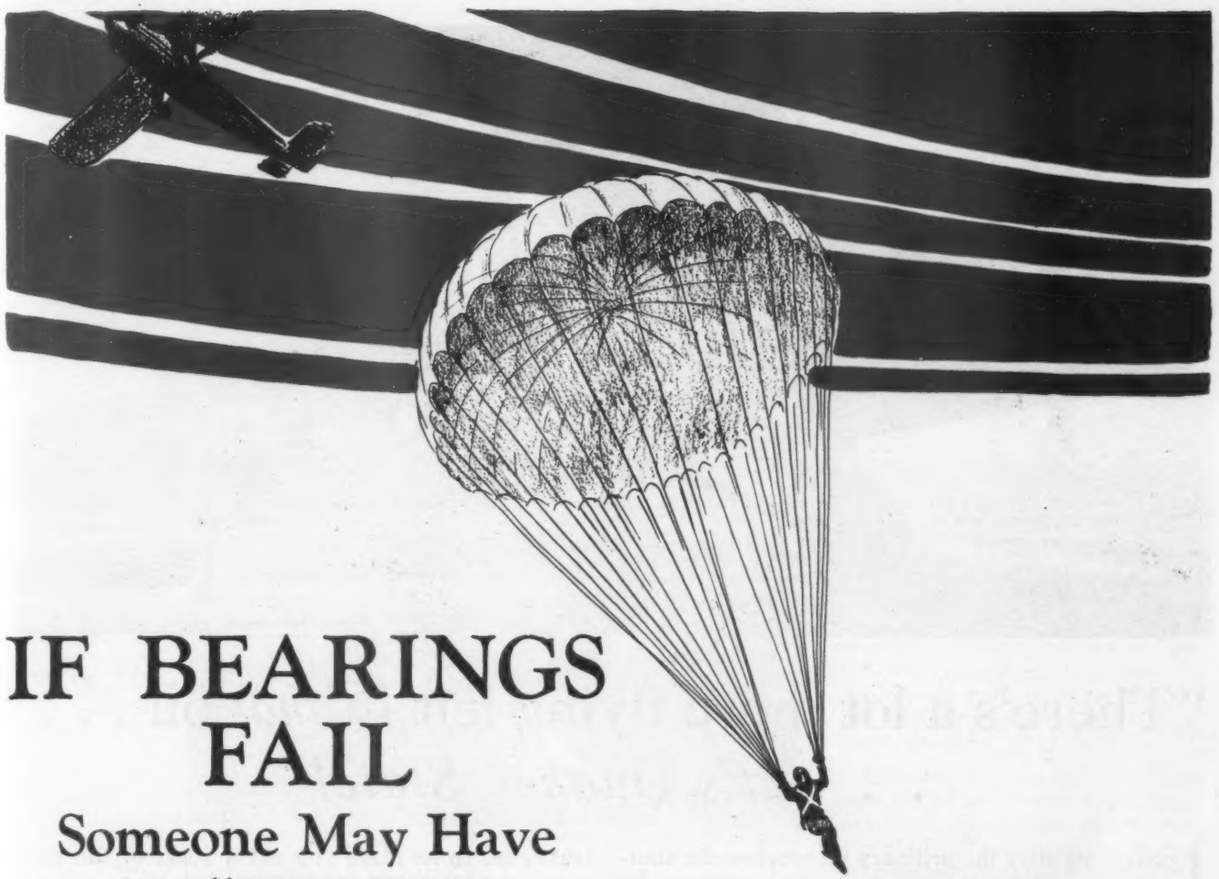
Hazards are reduced to a minimum in planes using Skelly products. Pilots know this by experience. And mechanics know a plane sent out thus serviced, will return none the worse for wear, no matter how long or hard the flight.

SKELLY AERODYNAMIC GASOLINE

SKELLY AIRPLANE OIL

SKELLY

AVIATION SALES DEPARTMENT SKELLY OIL CO., TULSA, OKLA.



IF BEARINGS FAIL

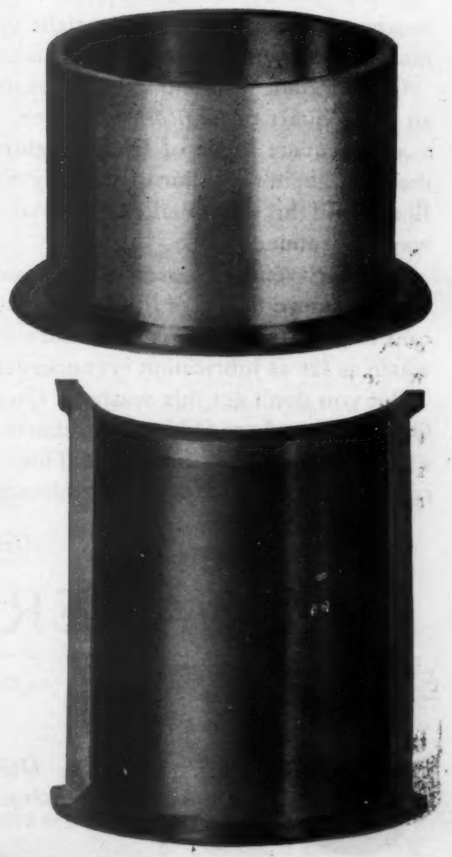
Someone May Have To "Step Out"

THAT is why manufacturers of the country's most powerful, most dependable aeroplane engines use Allison Steel Back Bearings.

Lined with High Lead Bronze, Allison Bearings withstand the severe loads and strains imposed by mounting speed and motor power.

The development of this type of bearing is a monumental achievement in the field of Aero-Motive engineering.

Let us explain why. Write.



Allison Engineering Co.
INDIANAPOLIS, IND.

"There's a lot more flying left in *that* oil . . . . . it's *Quaker State!*"

LONG, long after the ordinary oil reaches the shot-to-pieces point, Quaker State Aero Oil holds its tough, oily body—and keeps right on giving your motor that sweeter, silkier lubrication.

Quaker State lasts and lives longer because there's an extra quart of *lubrication* in every gallon of it—a whole quart more of friction-fighting lubrication than you get in the gallon of ordinary oil. The reason? Because of the way Quaker State Aero is made, the way it is refined.

Ordinary refining leaves in every gallon of oil, one quart or more that is of little or no value as a lubricant to your motor—it is little more than a quart of waste as far as lubrication is concerned.

But you don't get this waste in Quaker State, for Quaker State Aero Oil is *super*-refined—carried a step further than ordinary oils. This extra step removes the quart of waste that ordinary refining leaves in. In its place you get a quart of the finest *lubricant*—a quart more than you get in the gallon of ordinary oil—you actually get an *extra* quart in every gallon of Quaker State!

And—*mighty* important—every single gallon of Quaker State Aero Oil is made from 100% pure Pennsylvania Grade Crude Oil. There's no better—it's the finest the world produces!

Ask for Quaker State at your airport—and you'll get the sweetest lubrication you ever found for your motor, anywhere. It's remarkable how it retains its body. It will stand heat that would cripple an ordinary oil—it's the greatest aero oil that ever kept a motor out of mischief. Try it!

Tune in on the Quaker State Program every Friday evening at 10 o'clock E. S. T.—coast-to-coast Columbia Network.

Get that extra quart in every gallon of

QUAKER STATE AERO OIL

TRADE MARK REG. U. S. PAT. OFF.

QUAKER STATE OIL REFINING CO.
Oil City, Pa.

. . . . . *Other Pure Pennsylvania Products are:*

QUAKER STATE MEDIUM MOTOR OIL · QUAKER STATE MEDIUM HEAVY MOTOR OIL
QUAKER STATE HEAVY MOTOR OIL · QUAKER STATE COLD TEST
QUAKER STATE TRACTOR OILS

Guaranteed 100% PURE PENNSYLVANIA OIL
The highest grade oil in the world

TRAVEL TIME OF 6 *DAYS* *is cut to* 6 *HOURS with a* SIKORSKY AMPHIBION

By air travel the Creole Petroleum Corporation exchanges days for hours across South America's oldest republic

The country over which the "Creole" flies varies from river deltas to densely wooded mountain ranges. Plains, lagoons, volcanic mountains and Guiana highlands are targets for the cameras of the Sikorsky Amphibion, "Creole."

Over seacoast, mountains, jungles the "S-38" provides dependable, swift, comfortable transportation

Above photos by Johnson Brothers

This "S-38" Sikorsky Amphibion is used by the Creole Petroleum Corporation—a subsidiary of the Standard Oil Company (N. J.)—for direct transport of employees and aerial surveys of difficult or inaccessible country.

New world's seaplane records for altitude with load and speed with load were recently established with a Sikorsky.

"CREOLE," the Sikorsky Amphibion of the Creole Petroleum Corporation, is particularly well suited to the exacting duties assigned to her. Six hundred miles of mountains, jungles and rivers separate Maturin and Maracaibo, Venezuela. Between these important cities employees of the Company must travel. Ordinarily the trip requires from six to ten days. In the Sikorsky Amphibion the time is cut to six hours.

Luxuriously comfortable, the ship puts every hour of travel in the classification of pleasure. And with her two 420 H. P. "Wasp" engines she has generous reserves of power, with ability to fly and maneuver on either engine. Her usual cruising speed is 110 miles an hour.

Lakes, rivers and lagoons provide perfect landing fields for the "S-38," which is transformed from landplane to seaplane in a matter of seconds. This feature, so essential to a ship used in the Orinoco basin country, is equally important in a ship for intercity use in the States. Many cities whose nearest fields are miles from business centers have suitable water landing facilities close at hand.

Sikorsky Amphibions are proving themselves excellent investments in the service of business and industrial firms, transport lines and individuals. In a folder recently issued there are some rather interesting facts concerning the essential advantages of the "S-38." May we send you a copy?

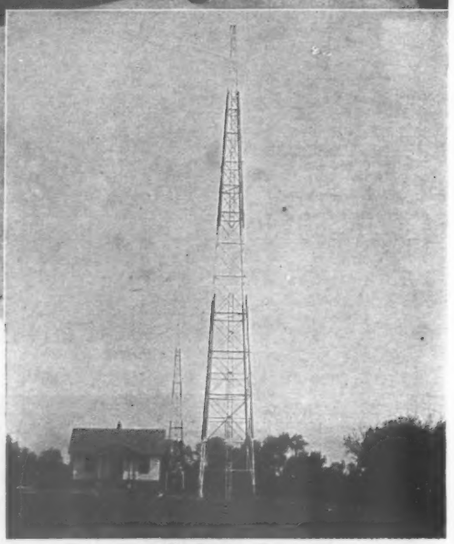
SIKORSKY AMPHIBION

SIKORSKY AVIATION CORPORATION, BRIDGEPORT, CONNECTICUT
DIVISION OF UNITED AIRCRAFT & TRANSPORT CORPORATION

WHEN THE FOG HANGS THICK AS PEA SOUP

When the fog hangs thick as pea soup or when darkness overtakes you, IDECO Radio or Lighted Beacon Towers guide you safely to your destination. IDECO Airway Towers are used exclusively on 90% of the lighted airways.

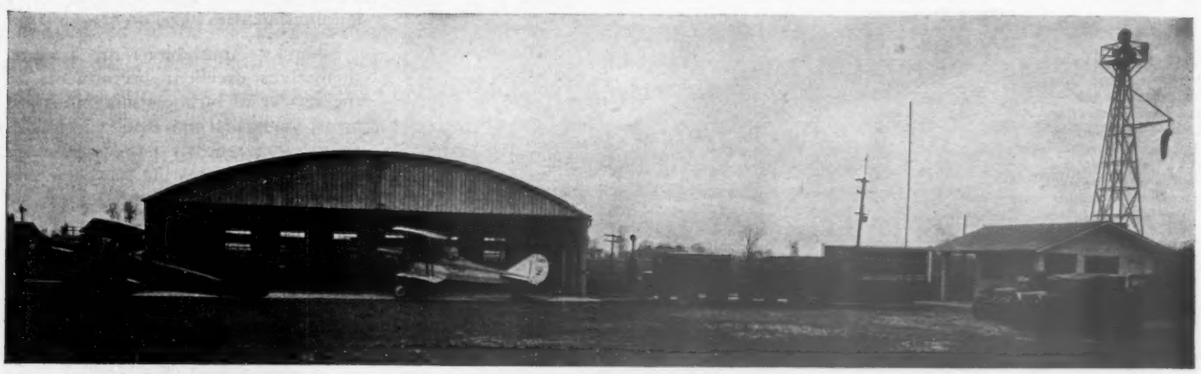
Fit companions of the Radio and Beacon Towers are IDECO Steel Hangars and Airport Buildings. With good flying weather at hand, get in touch with IDECO for your Airport Buildings and Equipment.



T. A. T. Radio Beacon Tower, Ideco Built Columbus, Ohio

A catalog describing in detail the many outstanding features of IDECO Hangars and the various towers and other airway and airport equipment is yours for the asking.

Avoid delays—get this information at once.



Ideco Steel Hangar and Beacon Tower, Municipal Airport, Springfield, Ohio

The International Derrick & Equipment Company

Columbus, Ohio **Houston, Texas** **Los Angeles, Cal.**

New York **Pittsburgh** **Wichita** **Tulsa** **Ft. Worth** **Beaumont** **Shreveport** **Maracaibo, Venezuela**

Export Office—74 Trinity Place, New York

753

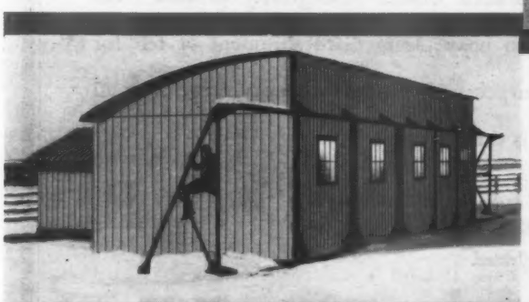
BUTLER

READY MADE STEEL HANGARS

for

INDIVIDUAL
FLYING SCHOOL
COMMERCIAL
AND AIRPORT
PURPOSES

STEEL BUTLER PRODUCTS



A new booklet pictures installations of Butler Ready-made Hangars. Butler engineering service will supply full information and prices if you will mention the size building in mind.

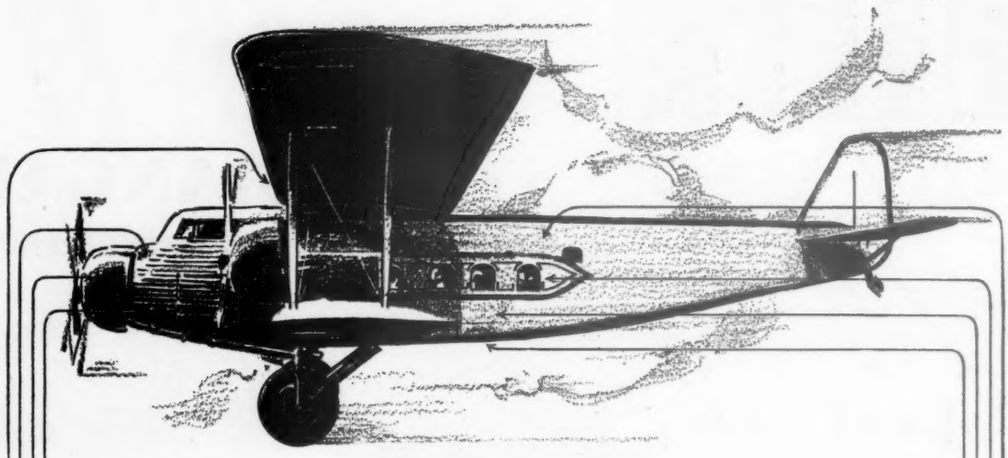
COMPLETENESS, economy in acquiring, economy in maintenance, fire safeness, speed in erection, appearance and structural qualities which make for permanence, yet which permit enlarging or taking down and re-erection—all these are Butler Ready-made Hangar characteristics. Their sum total is the common sense solution of the airplane sheltering problem.

Sizes range from the large airport types with clear spans of 80 feet or more down to the individual T-shaped, round or gable roof hangars for any size airplane. Air stations along transport lines, flying school hangars and training quarters, plant buildings for aircraft factories, ground equipment and material warehouses and repair shops are some of the many other air industry purposes served by Butler Ready-made Steel Buildings. Butler designs include combinations of steel and stucco and steel and brick veneer.

Butler Manufacturing Company

1245 Eastern Ave. Kansas City, Mo.

945 Sixth Ave., S. E. Minneapolis, Minn.



FELT

expressly designed for

- motor washers and gaskets
- strips in magneto
- instrument board insulation
- gas tank strap liners and oil tank insulation
- floor covering insulation
- insulation for cabin
- window channel strips
- sound-proofing in cabin walls

A different felt for each particular purpose—manufactured, cut and shaped to exact requirements; determined by scientific laboratory research and practical experience—or made to your own specifications. The Felters Company operates three large factories, a modern cutting plant, and nine branch offices strategically located from coast to coast. Immediate shipment of felt for any purpose . . . . in any quantity, large or small . . . . is thus assured.

Blue prints—specifications—samples—send us one or all of them. We will then submit quotations and suggestions and advise you of any savings that might be effected.

The FELTERS Co., Inc.

Manufacturers of Felts

99 Bedford Street Boston, Mass.

BRANCHES
NEW YORK
CHICAGO
PHILADELPHIA
ST. LOUIS

BRANCHES
CLEVELAND
DETROIT
SAN FRANCISCO
LOS ANGELES

MILLS: MILLBURY, MASS., MIDDLEVILLE, N. Y., JOHNSON CITY, N. Y., JACKSON, MICH.

HALF A CONTINENT OF *EXTRA* MILEAGE

that's what you get with every filling of

PENNZOIL

"THE BEST MOTOR OIL IN THE WORLD"

There is enough reserve mileage in every filling of Pennzoil to take you more than half way across the continent. Here are the figures:

Ordinary oils must be drained at 15 *hours. Pennzoil may be used from* 30 *to* 40 *hours. In other words, Pennzoil gives you at least* 15 *extra hours with every filling.*

What does this reserve mileage mean? In the first place, it means reserve *safety*—it guarantees you extra endurance in every emergency.

In the second place, it means reserve *power*. The reason—Pennzoil resists continued heat and friction—you'll never know what giving her the gun means until you give your motor Pennzoil.

Third, this reserve mileage stands for *economy*—not only in the cost of the oil itself, but as insurance against high repair costs and worn-out motors.

No wonder America's greatest passenger lines specify Pennzoil for every plane. No wonder that operators who look at lubrication from a business standpoint choose Pennzoil. Pennzoil is made from 100% pure Pennsylvania crude—and nothing else. It is always uniform in quality because it is refined *only* by the famous Pennzoil process in the refineries of the Pennzoil Company—largest organization in the world operating exclusively on Pennsylvania crude.

Use Pennzoil—and you'll never worry about lubrication trouble again!

THE PENNZOIL COMPANY, Oil City, Pa.
Division Offices: New York, Chicago, Los Angeles

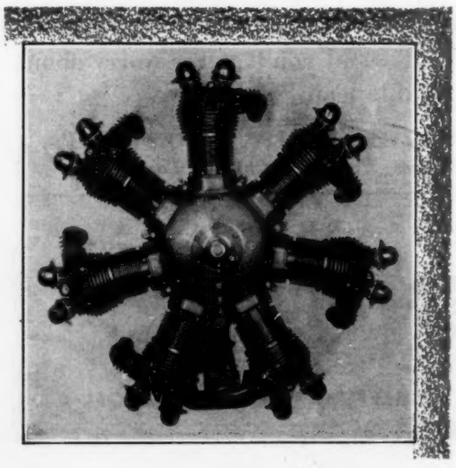
PENNZOIL

HIGHEST QUALITY PENNSYLVANIA OIL

Permit No. 2—Pennsylvania Grade Crude Oil Ass'n

It takes longer to build the Axelson ...

Unmindful of the exactions of speed demands on mechanics in most plants, Axelson policies have never permitted hurried manufacture to interfere with quality requirements. Even though the Axelson plant has every facility for high speed production, each mechanic is coached to perform each operation with *deliberate* care.

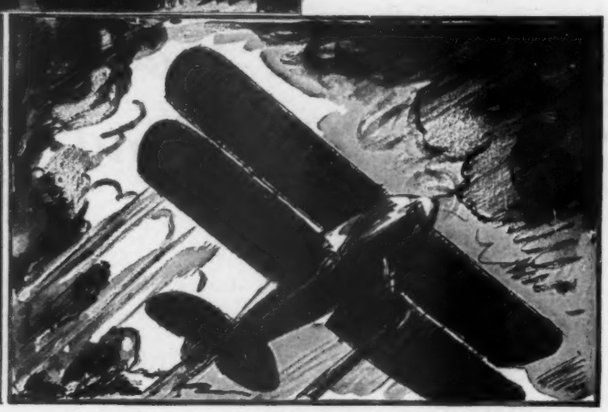


Many additional hours are invested in the building of each Axelson Engine with the certain result that each part is better finished. Infinite care is given to infinite detail.

A flight with your hand at the throttle of an Axelson will give you a new thrill and sense of security. You may obtain an immediate demonstration.

Axelson Aircraft Engine Co.
Factory and General Offices
Corner Randolph St. and Boyle Avenue
Los Angeles, California
(P. O. Box 337)

AXELSON AIRPLANE ENGINES



LABORATORY, TEST BLOCK AND FLIGHT

In Ohio It's -TP- SOHIO Aero Motor Lubricating Oil

Marketed in Ohio *Exclusively by* The Standard Oil Company of Ohio

BY every test -TP- Aero Motor Lubricating Oil plainly demonstrates its superiority. It represents a great stride ahead in the science of lubrication. -TP- eliminates many causes of engine trouble—reduces the risks of flying.

-TP- Aero Motor Lubricating Oils are new—the latest development in scientific lubrication. They have been tested and approved by leading manufacturers of airplane engines and by many leading pilots. They are straight-run oils, not blended or compounded, produced from pure, paraffine-base crude by a process for which patents are pending.

This process has marked advantages over other methods. It removes all the paraffine wax, while preserving all the lubricating bodies in the crude. Elimination of the wax is responsible for its low cold test.

In terms of performance this means uniform viscosity at all working temperatures, minimum carbon deposit and ignition trouble from fouled spark plugs, easy cold priming, immediate oil pressure, perfect lubrication winter and summer, on the ground or at high altitudes—a maximum of safe flying hours.

A handsome, practical *Pilot's Log Book* sent free on request.

-TP- Aero Valve Spring Lubricant

Also -TP- Aero Rocker Arm Lubricant

TEXAS PACIFIC COAL AND OIL COMPANY
FORT WORTH, TEXAS
New York St. Louis Los Angeles

-TP- AERO MOTOR LUBRICATING OIL

REG. U. S. PAT. OFF.

2778

Thompson Valves from Famous Cylinders

(This advertisement is one of a series showing Thompson Valves from some of the historic aero motors that used them in setting new world's endurance records.)

. . . from the "City of Cleveland"

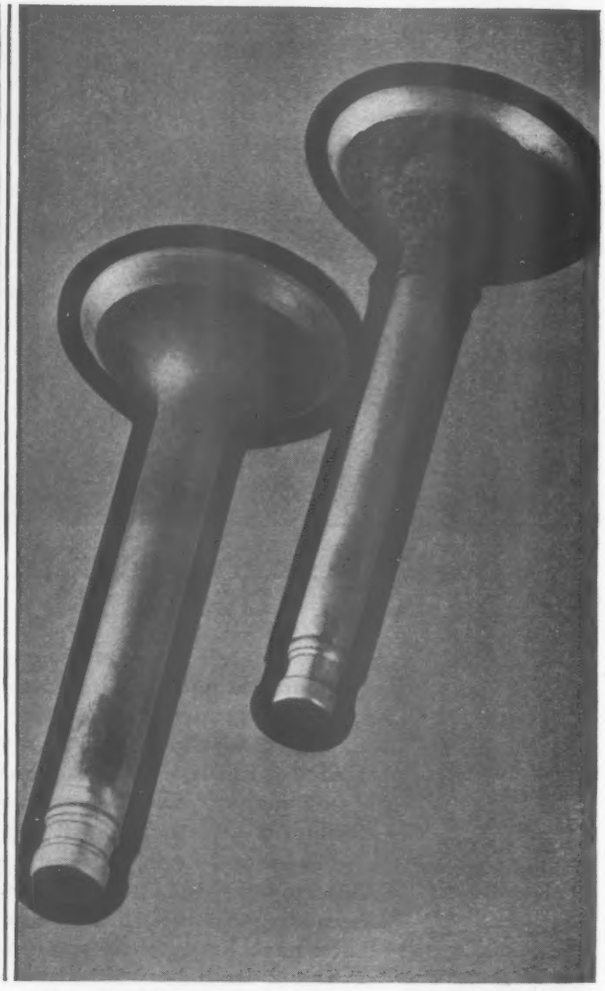
Only valves of extreme accuracy and stamina could stand up under punishment like this! More than a week of rapid opening and closing — of cherry-red heat —of constant pounding on the valve seats!

Yet, after the 174-hour flight of the "City of Cleveland" in July, 1929, the Thompson Valves that helped set this record showed no evidence of deterioration. The unretouched photograph reproduced on this page shows two of them soon after the flight. Their condition is typical of the 18 Thompson Valves that flew with the "City of Cleveland."

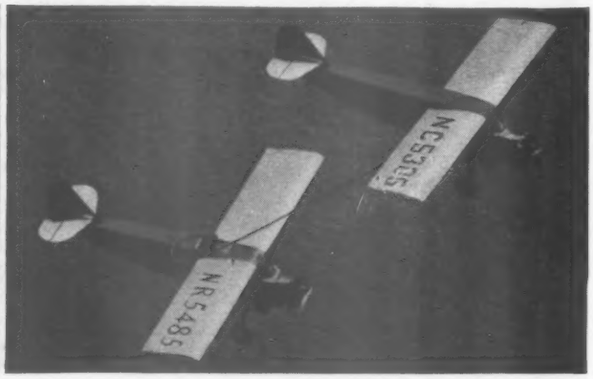
Performance such as this in every test has influenced aero engineers to specify Thompson Valves. Today, Thompson Valves are used in 95% of all American aero engines.

THOMPSON PRODUCTS, INCORPORATED
General Offices: Cleveland, Ohio, U. S. A.
Factories: CLEVELAND and DETROIT

Thompson Valves



Two Thompson Valves that helped make history. An exhaust valve and an intake valve taken from the "City of Cleveland" immediately after its famous flight.



CONTACT!

Exide Aircraft Batteries provide an easier and more efficient method of starting

PILOTS everywhere who enjoy the convenience and safety of electric starting find Exide Aircraft Batteries absolutely dependable for this job and many others.

These batteries can be relied upon to jump to their job with a surge of current or a steady, even flow, as may be required. Millions of miles stand witness to the trouble-free, economical performance of Exides in the hardest kinds of flying service. And Exide Aircraft Batteries are specially designed so that the electrolyte will not spill . . . are built to conform to the rigid requirements set for aircraft equipment.

Not only do Exide Aircraft Batteries provide efficient, economical starting and ignition, but they also furnish dependable, steady current for landing, cabin and instrument board lights . . . avigation lights . . . and radio power.

Write today. We will send the details about Exide Aircraft Batteries, the many different types and their varied applications. There's no obligation whatsoever.

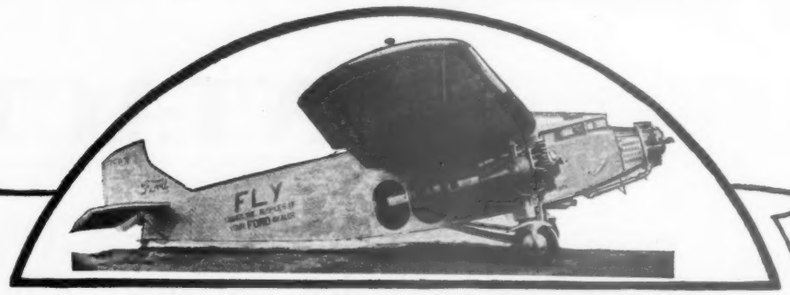
This light, compact Exide battery is especially built to conform with rigid air requirements.

Exide
AIRCRAFT
BATTERIES

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia
THE WORLD'S LARGEST MANUFACTURERS OF STORAGE BATTERIES FOR EVERY PURPOSE
Exide Batteries of Canada, Limited, Toronto

UNIVERSAL FLYERS, Washington, D. C.

Establish New Record in FORD TRI-MOTOR with GULFPRIDE OIL 120



UNIVERSAL FLYERS
INCORPORATED
WASHINGTON, D.C.

Gulf Refining Company,
Pittsburgh, Penna.

Gentlemen:-

You will no doubt be interested in knowing something of the results that we have been obtaining through the use of GULFPRIDE OIL and GULF NO-NOX MOTOR FUEL in our Ford Tri-Motored All-Metal Monoplanes.

As you know, our planes have been used to make an educational tour, under the auspices of Ford Dealers, throughout the country. The first one of our ships was started out in September 1928, and in its first year, through the 15th of September 1929, made a world's record for plane and pilot, for the greatest number of passengers carried in any one airplane during a similar period; having carried more than 25,000 people, made over 4000 take-offs and landings, and having flown during that period approximately 70,000 miles. The most important feature of the accomplishment, we feel, is the fact that every flight was completed safely and never once was it necessary to make a forced landing.

We have just overhauled the motors now for the third time - the total number of actual flying hours being in excess of 900 - the cost of parts replaced at each overhaul was reasonably low, the parts used in this third overhaul totaling only $304.00 for all three motors.

Our Mr. Ray Loomis, formerly of the Ford Airport at Detroit, piloted this plane during the entire period and he, as well as ourselves, feel that this wonderful motor performance is due, in a great measure, to the constant use of GULFPRIDE OIL and GULF NO-NOX MOTOR FUEL.

A greater number of the fields that we operated from had untreated dirt runways and in dry weather our three motors blew up clouds of fine sand and dirt. This was particularly bad for us because of the great number of take-offs and landings that we made each day; our average flight being 15 minutes. In spite of this hard service, however, we found when the motors were torn down during each of the three overhauls, that there was a decided absence of the usual sludge; also that the bearings each time were in perfect condition and even at the third overhaul, did not show any appreciable signs of wear.

Airmindedly,
UNIVERSAL FLYERS
Incorporated
Jno J. Rocca

GULF

"GULFPRIDE OIL"
"America's Finest Aircraft Oil"
GULF REFINING COMPANY

TODAY'S MOST EXACTING USER OF STEEL

THE BUILDER of airplane engines demands steels and forgings that conform to standards of quality far higher than were dreamt of a few years ago.

Realize the tremendous power and speed, the light weight, the high degree of dependability an airplane engine must possess, and you see why the engine builder is today's most exacting buyer of steel. Naturally, he is willing to entrust the safety and reputation of his product only to steels and forgings of whose high quality and uniformity he is certain, beyond all doubt.

Bethlehem has supplied many tons of fine steels to builders of airplane engines. Out of this experience, constantly supplemented by painstaking study, has grown a new set of standards which govern at every step in the manufacture and inspection of Bethlehem Steels for the aeronautical manufacturer. Bethlehem Steels and Forgings made in accordance with these standards are known as Steels and Forgings of "Airplane Quality."

The term Bethlehem "Airplane Quality" is more than merely a name. It stands for the strongest and most dependable steel for the specific task that unexcelled facilities and long experience can produce. You can entrust the safety and reputation of your product with entire confidence to Bethlehem "Airplane Quality" Steels and Forgings.

Bethlehem "Airplane Quality" Steels and Forgings will be on exhibit at the All-American Aircraft Show, Detroit. Space No. 14, Ingalls Airway.

BETHLEHEM STEEL COMPANY
General Offices: Bethlehem, Pa.

District Offices: New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Pittsburgh, Buffalo, Cleveland, Cincinnati, Detroit, Chicago, St. Louis.

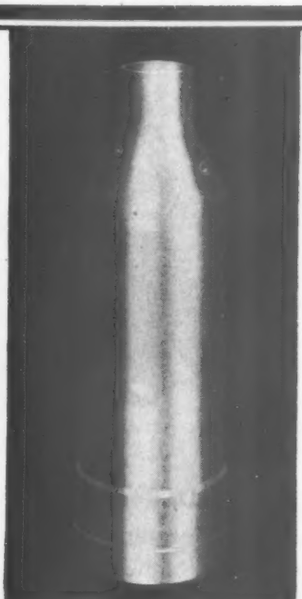
Pacific Coast Distributor: Pacific Coast Steel Corporation, San Francisco, Los Angeles, Portland, Seattle, Honolulu.

Export Distributor: Bethlehem Steel Export Corporation, 25 Broadway, New York City.

BETHLEHEM
"AIRPLANE QUALITY"
STEELS • FORGINGS

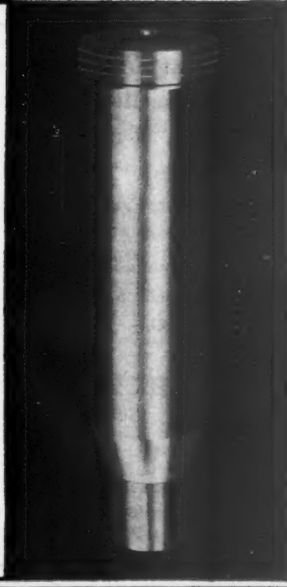
NO OTHER PART OF AN AIRPLANE IS MORE PRECISION-BUILT

THE cylinder of Aerol Military Struts are machined in one piece from a single chrome-nickel-steel extruded or tube forging specially heat-treated in modern electric furnaces under pyrometer control. The possibility of flaws in the metal or errors in heat-treating are eliminated.

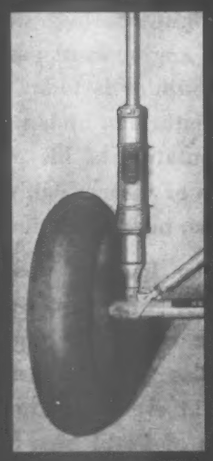


THE finished cylinder is exactingly machined to rigid limits. One one-thousandths of one inch is the maximum tolerance allowed, and rigid inspection prevents the passing of any cylinders not meeting these requirements.

THE piston assembly also represents the highest quality of materials and workmanship. The piston is made from special chrome-nickel-steel extruded or tube forging and the carefully fitted head is of slow-wearing gun metal. The special packing holds a perfect seal throughout years of active service.



THE finished strut combines fine materails, workmanship and superior design. No other type of landing-shock absorber can equal the operating efficiency and long life of these struts. That is why there are more Aerol Struts in use today than any other make.



BUILT BY THE CLEVELAND PNEUMATIC TOOL CO., CLEVELAND

AEROL *shock absorbing* STRUT

ARE YOU losing revenue because planes are unable to land or take off your runways in wet weather? *Tarmac surfaces soon pay for themselves.*

Are you losing money in parking fees because you have no surface on your parking areas? *Tarmac surfaces soon pay for themselves there.*

Are you losing possible patronage because there are no adequate all-weather approach roads to your airport? *Tarmac soon pays for itself there.*

Surface

RUNWAYS
PARKING AREAS
HANGAR APRONS
CONNECTING ROADS
TAXI STRIPS

at moderate cost with **Tarmac**

This matter of airport surfacing has to be decided with a knowledge of its effect on a field's revenues. Curtiss-Bettis Field, near Pittsburgh, laid Tarmac-surfaced runways last fall, and for the first time kept the field in constant uninterrupted operation throughout the winter . . . with air mail in and out every day and night, with 5,000 passengers handled in seven fall and winter months, with many private fliers selecting the field as their base of operations.

Surface your field with Tarmac . . . it will soon pay for itself. Write for information on Tarmac for airport paving.

AMERICAN TAR PRODUCTS COMPANY

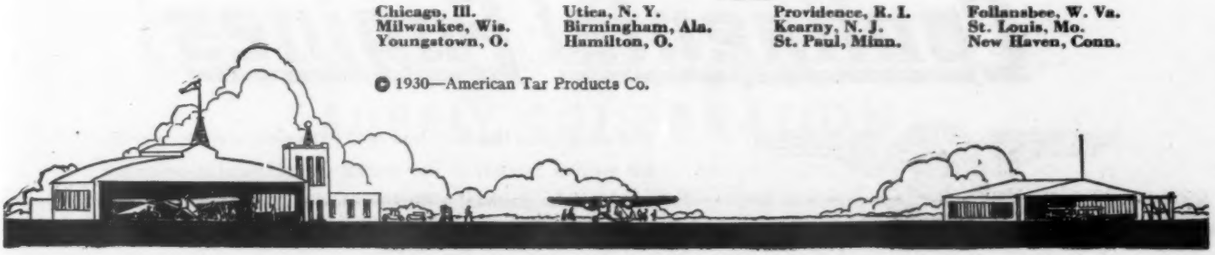
Division of The Koppers Company

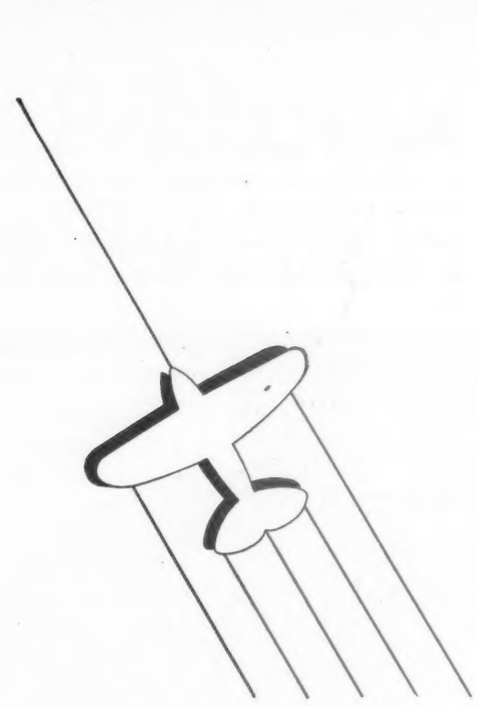
GENERAL OFFICES: PITTSBURGH, PA.

Plants:

Chicago, Ill.	**Utica, N. Y.**	**Providence, R. I.**	**Follansbee, W. Va.**
Milwaukee, Wis.	**Birmingham, Ala.**	**Kearny, N. J.**	**St. Louis, Mo.**
Youngstown, O.	**Hamilton, O.**	**St. Paul, Minn.**	**New Haven, Conn.**

© 1930—American Tar Products Co.





PRECISION BUILT . .

There are 4 cardinal points of practical aircraft power. They are dependability, economy, convenience and smoothness. All result from the same basic fundamental of construction—precision. Continental has entered the aeronautical field with the unalterable purpose of building the best aircraft engines in the world. They are Precision Built. Continental is producing Practical Aircraft Power.

"Approved Type Certificate No. 32, U. S. Department of Commerce"

CONTINENTAL AIRCRAFT ENGINE CO.

General Office and Factory: Detroit, Michigan

Continental Engines

Drawing upon the facilities and experience of the greatest engine builder in the world, Continental is uniquely enabled to counsel with the trade in the design and production of engines to fit individual requirements.

WHEN HOURS OR MINUTES *mean dollars to you*

EMERGENCIES develop suddenly! You may require materials for a motor repair job at once. To finish an extension on time, you need more wiring materials. Again, an unexpected decision to increase production requires reflectors and MAZDA lamps immediately. More than one department or a few individuals are concerned, for unless you secure materials promptly, your entire production schedule may be affected.

In emergencies such as these... when hours or minutes mean dollars to you ... the ample, readily accessible stocks of the General Electric Supply Corporation assure quick deliveries.

The General Electric Supply Corporation consists of more than 80 wholesale warehouses, strategically located throughout the United States. All communities are supplied within a few hours—*and many are reached in minutes.* No electrical distributing organization anywhere can give more prompt shipping service.

Thus the General Electric Company has taken another forward step to meet the nation's fast-multiplying electrical requirements. The General Electric Supply Corporation, utilizing the experience of the oldest and largest electrical manufacturing organization in the world, enables you to secure supplies and materials exactly when you want them. When you have an electrical need—*write!*

... to serve better the electrical needs of America

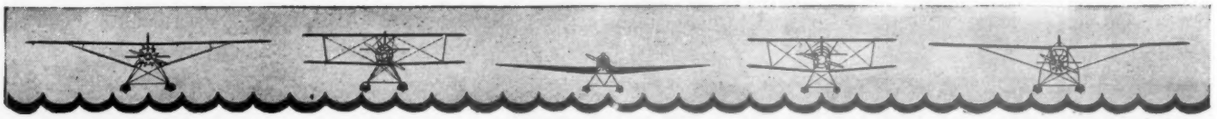
Join us in the General Electric Hour, broadcast every Saturday evening, over a nation-wide N. B. C. network.

GENERAL ELECTRIC

SUPPLY CORPORATION

GENERAL OFFICES BRIDGEPORT, CONNECTICUT

EDO ALLY OF AIRPLANE QUALITY



Bellanca "CH" 300 | Waco 10 | Aeromarine—Klemm | Consolidated—"Fleet" | Travel Air—"SB 6000"

THERE is no reason for gambling on float equipment when proved superiority is right at hand. An overwhelming majority of the floats on all types of commercial planes are made by EDO. The standard float equipment of Western Canada Airways, who fly over half of the total Canadian mail and freight, is EDO. The U. S. Department of Commerce has licensed over twenty different types of seaplanes with EDO Floats—more than all other manufacturers combined. EDO Floats must be good to merit such universal choice!

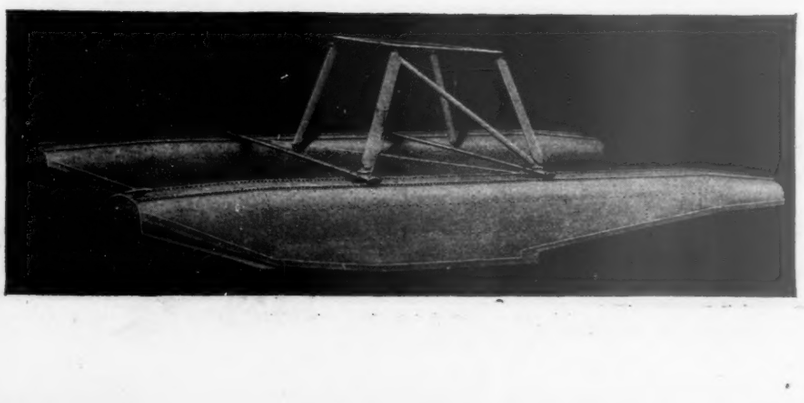
Every EDO installation is the substantial total of all desirable float features. Check these outstanding points: Entirely of metal, a single, homogeneous unit that will not rot, shrink nor absorb water—"Alclad" metal sheeting, proof against corrosion—exclusive and patented fluted bottoms for rigidity and quick

Lockheed "Vega" | Ryan "B-5" | Travel Air "SA—6000" | Curtiss Robin—Challenger Motor and Wright J-6 165 | Stinson "SM—IF"

take-off—water-tight bulkheads every two feet for buoyancy in spite of severe damage—extra heavy keels to permit sliding about without cradles—heavy side sheets to eliminate complicated internal trussing—flat decks with upstanding, riveted side seams to give secure footing and permit easy removal for overhaul—a shallow stern for easy taxying and backing well up on a runway.

EDO Floats are designed and built by an organization devoted exclusively to seaplane installations. EDO engineering is backed by years of experience. Airplane manufacturers, and operators may be sure that their planes, EDO-equipped, will give perfect performance as seaplanes. Entire float installation problems can be presented to EDO with the assurance of their ready, thorough and positive solution. EDO cooperation is cordially extended to all who have not yet availed themselves of it. Address—EDO Aircraft Corporation, 600 Second Street, College Point, L. I.

Travel Air S 4 D and S B C—4000 | Stearman C-3 B | "Gipsy Moth" | Commandaire 5-C-3 and 3-C-3 A | Travel Air "S E 4000" and 2000



EDO

THE FLOAT MAKERS

Pick Your Ship

From these Remarkable Used Plane Bargains

Every ship licensed for passenger carrying—every ship inspected, put in good flying condition and certified by Curtiss-Wright. Many of these are pink-of-condition "demonstrators." Your choice on easy payment terms. For prompt and complete cooperation, wire or write without delay to Curtiss-Wright Flying Service bases listed below, or to 27 West 57th Street, New York.

CURTISS-WRIGHT
For Your Protection:

1. Accepts in trade only *licensed* aircraft and engines.
2. Sells used equipment only when it is *airworthy.*
3. Examines every used plane and engine—gives you a *complete* and *accurate* report on its condition.
4. Issues an inspection certificate with every sale.

MAKE	TYPE	ENGINE	DC No.	HOURS	PRICE	BASE
Cessna	4 pl. Cabin	300 Whirlwind	NC-301-M	15	$7,850	Miami
Cessna	4 pl. Cabin	225 Whirlwind	C-9863-M	37	5,675	Memphis
Cessna	4 pl. Cabin	225 Whirlwind	NC-631-K	9	5,805	Columbus
Cessna	4 pl. Cabin	300 Whirlwind	NC-638-K	4	7,980	Dallas
Cessna	4 pl. Cabin	Warner	C-9852	107	3,515	Columbus
Cessna	4 pl. Cabin	Warner	NC-8144	30	3,900	Valley Stream
Cessna	4 pl. Cabin	Warner	C-8784	59	3,755	Los Angeles
Cessna	4 pl. Cabin	Warner	C-8795	94	3,580	Chicago
Cessna	4 pl. Cabin	Warner	C-8792	96	3,540	Oklahoma City
Cessna	4 pl. Cabin	Warner	C-8145	87	3,615	Raleigh
Cessna	4 pl. Cabin	Warner	NC-8148	60	3,750	Boston
Cessna	4 pl. Cabin	Warner	C-8791	25	3,925	Miami
Cessna	4 pl. Cabin	Warner	C-9858	110	3,485	Memphis
Cessna	4 pl. Cabin	Warner	C-8785	33	3,885	Columbus
Cessna	4 pl. Cabin	Warner	C-8143	59	3,755	Kansas City
Cessna	4 pl. Cabin	300 Whirlwind	NC-6449	8	7,920	Toledo
Cessna	4 pl. Cabin	225 Whirlwind	NC-644-K	9	5,805	Toledo
Cessna	4 pl. Cabin	Warner	NC-9093	108	3,495	Valley Stream
Cessna	4 pl. Cabin	Warner	NC-9094	117	3,465	Valley Stream
Cessna	4 pl. Cabin	Warner	C-9859	20	3,950	Cleveland
Cessna	4 pl. Cabin	Warner	C-8788	57	3,765	Indianapolis
Waco	3 pl. Open Bi	OX-5	NC-9506	70	1,500	Louisville
Waco	3 pl. Open Bi	OX-5	NC-5183	80	1,500	Camden
Travel Air	3 pl. Open Bi	Hisso	C-6149	128	2,300	Baltimore
Travel Air	3 pl. Open Bi	OXX-6	NC-6012	140	2,100	Hartford
Travel Air	3 pl. Open Bi	OX-5	NC-1142	200	1,000	Bridgeport
Travel Air	3 pl. Open Bi	Hisso	NC-6037	108	1,800	Louisville
Travel Air	3 pl. Open Bi	Millerized OX	NC-4851	314	1,500	Moline
Travel Air	3 pl. Open Bi	OX-5	NC-4427		1,500	Boston
Sparton	3 pl. Open Bi	Minus Eng.	NC-6577	140	1,750	Detroit
Stinson	4 pl. Cabin Bi	Wright J-5	NC-2779	400	4,000	Hartford
Fairchild	5 pl. Cabin Mono	Wright J-5	NC-5458	32	4,000	Portland
Fairchild	Photo Mono	Challenger	NC-32	652	3,000	Bridgeport
Fairchild	5 pl. Cabin Mono	Wright J-5	NC-4440	328	3,900	Louisville
Fairchild	5 pl. Cabin Mono	Wright J-5	NC-3569	206	3,500	Valley Stream
Fairchild	5 pl. Cabin Mono	Wright J-5	NC-3315	108 (Eng.)	4,000	Boston
Fairchild	5 pl. Cabin Mono	Wright J-5	NC-3569	9 (overhauled)	4,000	Pittsburgh
Command-Aire	3 pl. Open Bi	OX-5	M-931	87	1,200	Portland
Command-Aire	3 pl. Open Bi	OX-5	NC-480-E	118	1,100	Baltimore
Command-Aire	3 pl. Open Bi	OX-5	NC-584-E	5	1,600	Bridgeport
Command-Aire	3 pl. Open Bi	OX-5	NC-580-E	26	1,500	Baltimore
Command-Aire	3 pl. Open Bi	OX-5	907-E	19	1,525	Caldwell, N. J.
Command-Aire	3 pl. Open Bi	OX-5	243-E	50	1,400	Roosevelt Field
Command-Aire	3 pl. Open Bi	165 Whirlwind	974-E	40	4,300	Roosevelt Field
Command-Aire	3 pl. Open Bi	Warner	NC-608-E	43	3,655	Valley Stream
Command-Aire	3 pl. Open Bi	Warner	NC-515	86	3,440	Pittsburgh
Command-Aire	3 pl. Open Bi	Warner	NC-927-E	New	4,300	Boston
Command-Aire	3 pl. Open Bi	Warner	NC-526-E	56	3,590	Boston
Command-Aire	3 pl. Open Bi	165 Whirlwind	NC-977-E	44	4,280	Kansas City
Ireland	Amphibian	300 Whirlwind	NC-109-H	102	17,090	Rockland
Ireland	Amphibian	400 Wasp	NC-90-K	120	21,000	Roosevelt Field
Ireland	Amphibian	300 Whirlwind	NC-111-H	40	17,400	Roosevelt Field

Additional slightly used demonstrators of the lines manufactured by Curtiss-Wright—Robin, Travel Air, Moth and others—are now on sale at various Curtiss-Wright branches throughout the country. Full description and prices will be sent on request.

CURTISS-WRIGHT FLYING SERVICE

DIVISION OF CURTISS-WRIGHT CORPORATION

"World's Oldest Flying Organization"

PRECISION AIRCRAFT ENGINE PARTS

Ex-Cell-O Supplies Milled Thread Parts to the Leaders in the Aircraft Industry

When studs, screws, and bolts made of steel are used in conjunction with softer metal such as aluminum, there is a constant danger that threads which are die cut will re-tap the tapped hole. This danger is eliminated when threads are milled accurately.

Ex-Cell-O is equipped for the production of milled-thread parts of more than usual accuracy. It has long been Ex-Cell-O practice to pickle all material going into crankshaft and crankcase through bolts, thereby eliminating any chance of defective material getting into these highly stressed parts.

Visit Ex-Cell-O at the All-American Aircraft Show—

Lindbergh Airway Booth Nos. 27-33

1200 OAKMAN BOULEVARD • • DETROIT

Ex-Cell-O also manufactures precision gear, piston pins, cam followers, valve guides, automatic grinding machine products, and many others. All Ex-Cell-O aircraft parts are manufactured to manufacturer's specifications. Illustrated aircraft folder will be mailed upon request.

EX-CELL-O Aircraft (XLO) & Tool Corporation

THE AMPHIBION THAT GAR WOOD SELECTED

WHEN Gar Wood, eminent power boat racer and manufacturer, selected a Fokker Amphibion for his personal use, he paid a high tribute indeed to the performance of the plane, and the sturdiness of its build.

Powered with a Wright 525 h. p. Cyclone or Pratt & Whitney 575 h. p. Hornet motors, Fokker Amphibions have a high speed of 112 m. p. h., and a cruising speed of 95 m. p. h. Rigged as flying boats, they have a high speed of 120 m. p. h. For transport or personal use, these ships are also provided with two motors. In considering these ships, prospective purchasers will be interested to know that Fokker has built more airplanes than any other manufacturer in the world, that Fokker planes have made twice as many great pioneering flights as any other make of plane, and that Fokker planes have flown over 25,000,000 miles on transport lines, establishing a record for safety that has never been approached. Because of economies due to production principles of General Motors, prices are probably less than you might expect. Terms may now be arranged on the G M A C finance plan to suit your convenience.

For the use of business executives, for pleasure, and for transport use, Fokker now makes ten different models of airplanes: single and multi-engined types, land planes, sea planes, flying boats, amphibions. Requests for information or demonstration are invited, and will be promptly answered. Fokker Aircraft Corporation of America, General Motors Building, New York.

FOKKER

AFFILIATED WITH GENERAL MOTORS CORPORATION

R-W hangar door hardware---

50 years 1880/1930

R-W bottom rollers fit standard (12"x20") slots on "round-the-corner" and straight sliding steel and wood doors up to 3000 lbs. each. Side plates are integral units with no springs or other intricate parts to break or get out of order.

Preferred!

Wherever hangar doors are made and installed, R-W hardware is preferred. That's because each unit, each hidden part, is specially designed to provide smooth sliding and continued easy, trouble-free operation.

Ask your architect, your engineer, your door manufacturer. Consult an R-W engineer; counsel with him from the first planning stage. Write for catalog No. F-62.

"Quality leaves its imprint"

Richards-Wilcox Mfg. Co.

"A HANGER FOR ANY DOOR THAT SLIDES"
AURORA, ILLINOIS, U.S.A.

Branches: New York Chicago Boston Philadelphia Cleveland Cincinnati Indianapolis St. Louis New Orleans Des Moines Minneapolis Kansas City Los Angeles San Francisco Omaha Seattle Detroit Atlanta Richards-Wilcox Canadian Co., Ltd., London, Ont. Montreal Winnipeg

Share WACO Success

F THE THOUSANDS OF READERS of this publication, there are not over a dozen men to whom this message is directed. To those few WACO offers an unusual opportunity.

Finishing the year 1929 with no surplus production and with a most favorable financial statement . . . with no entangling alliances and with the consequent advantage of flexibility and independence of action . . . WACO is in an enviable position this season, and offers corresponding advantages to the WACO distributing organization.

Likewise in the character and ability of its distributing organization, WACO is unusually favored. But there are still a few territories which offer splendid opportunity for immediate and future profit, to a select few individuals who can measure up to WACO standards, who can qualify for the WACO franchise.

Proved business ability . . . a record of successful salesmanship . . . personal integrity, of course . . . moderate but adequate finances . . . vision and enthusiasm for the possibilities in the aviation industry . . . capacity and inclination for consistent, intelligent, vigorous effort . . . these are the essential qualifications in the men to whom this opportunity is offered. Ability as a pilot is of secondary importance. It is desirable but can be readily acquired.

It is significant that the distributor who took delivery on the first WACO ever built is still numbered among the most loyal and enthusiastic WACO representatives . . . that a distributor located in a relatively unfavorable Eastern city disposed of fifty WACOs last year . that another distributor in a Mid-West territory has steadily increased sales year after year until he sold over a hundred WACOs . . . that the loyalty and stability of the WACO field organization is builded upon firm policies and uniform fair dealing . . . that adequate and fair dealer discounts consistently result in satisfactory net profits to WACO dealers.

If you are interested we would be pleased to discuss the matter with you in detail.

THE WACO AIRCRAFT COMPANY, TROY, OHIO.

"ASK ANY PILOT"

And now

SAVOIA MARCHETTI

is

HEYWOOD *Equipped*

START-ER *by* HEYWOOD

American Aeronautical Corporation
Cross Island Boulevard
Whitestone, Long Island N. Y.

EXECUTIVE OFFICES
730 FIFTH AVENUE
NEW YORK CITY

TELEPHONES

Sky Specialties Company,
Detroit, Mich.

Gentlemen:-

All Savoia Marchetti S-56 amphibians are equipped with Heywood starters and we feel after our experience in using them on our ships that we have made a happy choice.

Cold weather has, of course, brought the possibility of starting difficulties but with the usual careful treatment we are getting excellent results from the use of your starter.

We find that the Heywood starter is best suited to our requirements in equipping the Savoia Marchetti S-56 and we are most sincere in our commendation of your product.

Very truly yours,
AMERICAN AERONAUTICAL CORPORATION.
GEO. A. BRADY
Production Manager.

SKY SERVICE

The greatest of all indorsements—indorsement by use—is again given the Heywood Starter.

Because of its consistent dependability under all climatic conditions, its instantaneous, never-failing operation, the Heywood Starter has been adopted as standard equipment by the American Aeronautical Corporation, for the Savoia Marchetti 56.

Shown above is one of the New York Police Department planes. Service to which this plane is put calls for instant and positive response to demands on the starter, and for this reason Heywood has the unqualified commendation of the pilots for this department.

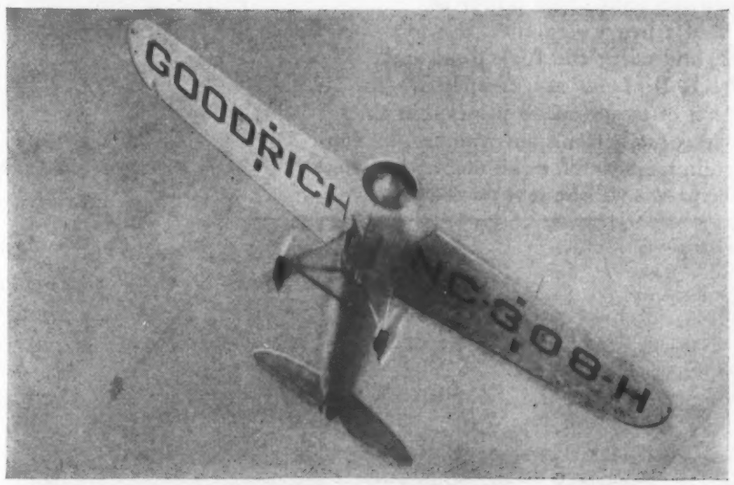
Complete details on request.

SKY SPECIALTIES CORPORATION
3651 Hart Avenue - - Detroit, Michigan

speaking of *Records...*

THE "WASP" GATHERS IN SIX MORE

LEE SHOENHAIR has just established six new world's speed records for class C airplanes. He flew the "Wasp" powered Lockheed Vega monoplane "Miss Silvertown," owned by the B. F. Goodrich Rubber Company. These new marks are as follows:



WITH 1000 KILOGRAMS LOAD

1. Distance of 100 kilometers at 175.997 miles per hour
2. Distance of 500 kilometers at 168.114 miles per hour
3. Distance of 1000 kilometers at 152.702 miles per hour

WITH 500 KILOGRAMS LOAD

4. Distance of 100 kilometers at 185.42 miles per hour
5. Distance of 500 kilometers at 171.288 miles per hour
6. Distance of 1000 kilometers at 152.702 miles per hour

Recognition by the Federation Aeronautique Internationale of these new records will credit the United States with 23 motor flight, heavier than air world's records. Pratt & Whitney will hold 12 of these, or more than half of this country's heavier than air records, and three times as many as are held by any other American aeronautical engine manufacturer.

Not only in the establishment of world's records, but in the everyday carrying of mail, passengers and express, "Wasp" and "Hornet" engines are demonstrating *that dependability* which comes only with proven design and unusual craftsmanship.

THE
PRATT & WHITNEY AIRCRAFT CO.
HARTFORD · · · CONNECTICUT
Division of United Aircraft & Transport Corporation

Manufactured in Canada by Canadian Pratt & Whitney Aircraft Co., Ltd., Longueuil, P. Q.; in Continental Europe by Bavarian Motor Works, Munich; in Japan by Nakajima Aircraft Works, Toki

Wasp & Hornet *Engines*

Made to the most rigid specifications to stand the gaff of training and sport

SUPPOSE the student does level off high! He'll learn something—and the ship can stand it. Fairchild KR Biplanes are taking the punishment of training work day after day, and of sport flying too. Their unusual ability to stand the gaff is due to design, and to the use of most exacting specifications that mean a large margin of strength. All welds, for instance, are in shear and not in tension. Fuselage, landing gear and other parts are of chrome molybdenum steel, which gives maximum strength where it is needed, yet holds the weight to the minimum. . . . Climb, often a vital factor in safety, distinguishes these ships, which have rates of 800 and 775 feet per minute. Ships that have to be wished out of small fields and over trees and wires have no place today. Fairchild believes that the only justifiable thrill in flying is based on complete confidence in the ability of the plane to fit the use you make of it. . . . In spite of their unusual strength, these planes are light. The power of the engine is used not to haul a heavy structure, but to provide speed and climb, and carry the fuel, pilot and passengers. Fairchild KR Biplanes are competitive in price. It is the opinion of experienced pilots that they offer better values in construction, performance, maneuverability and completeness of equipment. A booklet giving full descriptions will be sent on request.

FAIRCHILD KR-34. A. T. C. 162. THREE PLACE
Performance: TOP SPEED, 123 M.P.H. CLIMB, 800 FT. P.M. DISPOSABLE LOAD, 885 LBS.

Specifications: Wright J-6, 165 h.p. engine and metal propeller. Note really complete equipment: airspeed indicator, altimeter, compass, dash gasoline gauge, booster magneto, tachometer, dual controls, brakes, oil pressure and temperature gauges, cockpit covers, engine cover, logbook, tiedown ropes, tools, first-aid kit, fire extinguisher, engine instruction book, wired for navigation lights. This plane can also be had with 150 h.p. Comet engine, which alters performance slightly and increases disposable load and economy. Price, with either engine, $6575 flyaway Farmingdale.

FAIRCHILD KR-21. A. T. C. 215. TWO PLACE
Performance: TOP SPEED, 113 M.P.H. CLIMB, 775 FT. P.M. DISPOSABLE LOAD, 535 LBS.

Specifications: Kinner 100 h.p. engine and wood propeller, Complete equipment: airspeed indicator, altimeter, compass, dash gasoline gauge, booster magneto, tachometer, oil pressure and temperature gauges in both cockpits, dual controls, engine cover, cockpit covers, tiedown ropes, tools, fire extinguisher, first-aid kit, engine instruction book, logbook, wired for navigation lights, celluloid inspection windows at all control bearing points, detaching pan. Price, $4685 flyaway Farmingdale.

FAIRCHILD

KR BIPLANES

FAIRCHILD AIRPLANE MANUFACTURING CORPORATION
FARMINGDALE, LONG ISLAND, NEW YORK
Plants: Farmingdale, N. Y.; Hagerstown, Md.; Longueuil, P. Q., Canada
Division of The Aviation Corporation

CHASE

AIRCRAFT TRAVEL FABRICS

IN competition with newer and experimental types of upholstery and trim materials, Chase products are still leaders in the field of transportation. . . . And for this there is a reason:

The Pre-eminent Upholstery Fabric

CHASE

Velmo

MOHAIR VELVETS

combines perfect riding-luxury with last-word stylishness such as is to be found only in De Luxe vehicles of transportation . . . including passenger airplanes.

For Trim and Upholstery

CHASE

Leatherwove

Made by
SANFORD MILLS, SANFORD MAINE

A scientifically coated fabric—and a desirable complement to VELMO, when used as panel and door trim—or as upholstery for operators' seats. A strictly modern fabric in a wide variety of colors and grains, giving the utmost in service at a very moderate cost. *Visit the Chase Exhibit at the Show.*

These Chase Aircraft Travel Fabrics Made by SANFORD MILLS

L. C. CHASE & COMPANY, *Selling Agents*, BOSTON
NEW YORK - DETROIT - SAN FRANCISCO - CHICAGO

The passenger may sit in ease and comfort or move about with complete freedom; his Quick-Connector Air Chute instantly available in case of emergency.

Only the harness is worn in flight.

The pack is easily and quickly put on by pressing it against the chest. It snaps instantly to the harness and you are ready for any emergency.

Convenience and Safety Combined in the NEW . . .

Quick-Connector IRVIN AIR CHUTE

THE Quick-Connector type of Irvin Air Chute is not worn in flight, and is neither a cushion, nor otherwise a part of an airplane chair. The chute is carried in a pack conveniently near the passenger, ready for instant use in emergency.

All the patented safety features that have brought universal recognition to the Irvin Air Chute as the standard aerial life-saving equipment of the world, are retained in this new Quick-Connector type Irvin. It is but one of the five different types of Irvin Air Chutes, suitable to every need, and available in all parts of the country. If you do not know any dealers, write to us for address of the nearest one.

Dealers should communicate directly with the company.

IRVIN *The Life Preserver of the AIR*

IRVING AIR CHUTE CO., INC., 372 PEARL STREET, BUFFALO, N. Y.

Our Motion Picture "Happy Landings" on standard width film, illustrating actual operation of the Irvin Air Chute is available free of charge to schools, clubs and organizations interested in aviation. Send for booklet and particulars.

THE STRENGTH OF THE PLANE IS IN THE TUBING

Again!

at the
All-American Aircraft Show

TUBING by SUMMERILL

will be an important part of the Aircraft Exhibits

In many planes featured by prominent manufacturers Summerill Tubing is used exclusively.

Huge transports and small, fast sturdy sport and mail planes are built around the quality and workmanship of Summerill Tubing.

Be sure to visit the Summerill Tubing and Metlab displays. Booths 107-115.

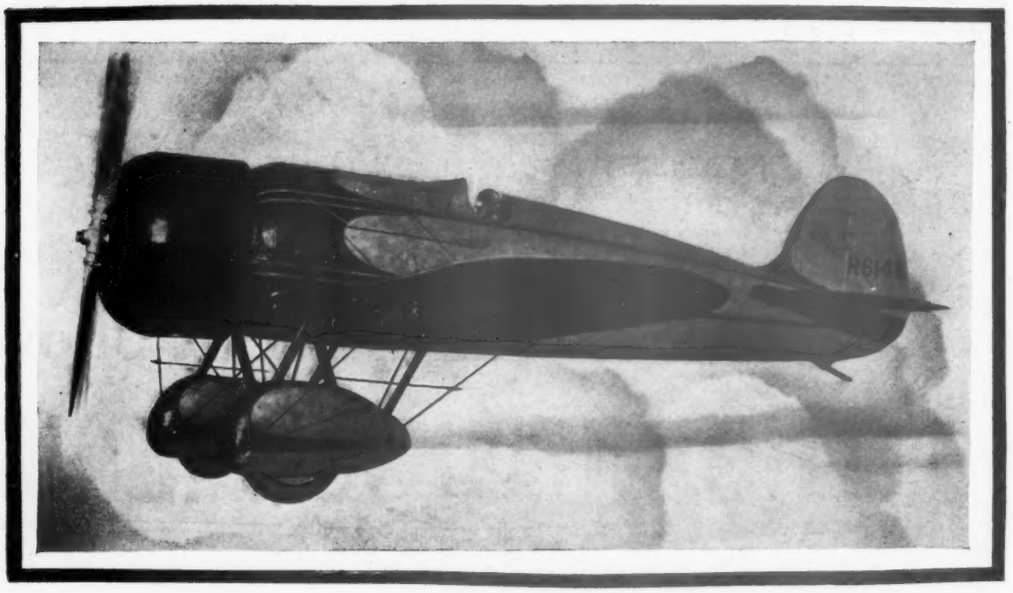
(a) See model draw bench in operation.

(b) We will show you at Detroit how seamless tubes are drawn.

(c) See why the finish of our tubes readily meet the Aircraft specifications, by the care with which they are drawn.

Summerill Tubing Company

Bridgeport (Phila. Dist.) Pa.



In achieving distinction in its performance in the 50-mile Labor Day Free-For-All Race at Cleveland, Ohio, in 1929, the Wright Whirlwind 300 H.P. Engine, powering the Travel Air "Mystery Ship," depended on SRB Ball Bearings for capacity and durability under these severe conditions.

SRB Ball Bearings

Sustained Every Stress and Strain of the Wright-Powered Travel Air "Mystery Ship" Record Performance....

WHETHER for radial loads on the crankshaft, enormous thrust loads in the propeller position or for the punishment inflicted on rocker arm bearings—SRB is the overwhelming choice of the aviation engine engineer—because SRB, size for size, gives greater load-carrying capacity and an absolutely uniform dependability.

SRB Ball Bearings lead the field in design, capacity and dependability.

STANDARD STEEL AND BEARINGS INCORPORATED
Plainville DIVISION OF MARLIN-ROCKWELL CORPORATION *Connecticut*

PACIFIC COAST DISTRIBUTORS
F. M. Cobbledick Co., *San Francisco, Cal.* E. D. Maltby Co., *Los Angeles, Cal.* Northwest Bearings Co., *Seattle, Wash.*

Ball SRB Bearings

ELGIN···AVIGO
INSTRUMENTS

AVIGO COMPASS
$50

NO DETOURS

A direct course for the pilot over land or sea is the duty of the Elgin Avigo Compass. Built to the exacting standards of three-quarters of a century of precision instrument building, this compass has met the instant approval of pilots.

The Elgin Avigo Compass meets an urgent demand for a compact, light weight, reliable compass. The bowl, card and compensator housing are of a new, more durable material.

The compensator is theoretically and practically correct in operation. The adjustment is positive and requires no knowledge of magnetics.

We will be pleased to furnish complete literature on the Avigo Compass or other Avigo Instruments. Just write:

Aircraft Instrument Division

ELGIN NATIONAL WATCH CO.

ELGIN ILLINOIS

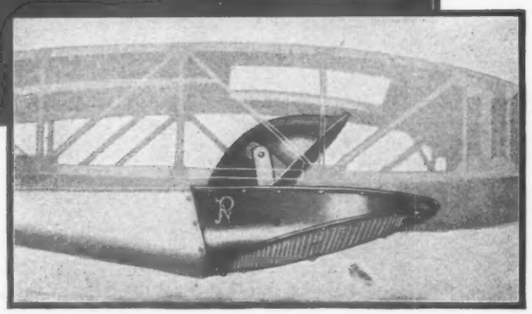
New York Office: 20 West 47th Street

West Coast Distributors: Pacific Airmotive Corporation
Los Angeles, California

For Easier, Safer Night Landings

Pyle-National Prismatic Lens Type Landing Light

Type LANR landing lights on an NAT mail plane.



Type LANR 12 inch landing light. Prismatic lens directs the beam forward. Beam adjustable horizontally and vertically.

PERFORMANCE that wins the enthusiastic approval of experienced pilots is combined with the simplest, cleanly streamlined installation in Type LANR landing lights. The clear, far reaching beam is wide enough for full pick-up of ground detail from 700 to 1000 feet altitude. The special lens and reflector characteristics including the sharp cut-off, give a white beam without stray light. The beam is adjustable both horizontally and vertically.

Type LANR, built into the under surface of the wing, has negligible head resistance and no effect on lift or aileron control. This landing light uses the new 12 volt, 20 ampere lamp.

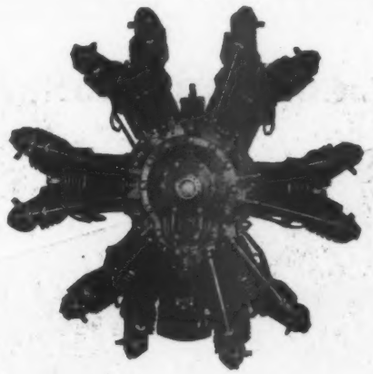
Write for catalog 210-B with full description

Pyle-National offers a complete line of airport and aircraft lighting equipment, including special wiring appliances for efficient and economical installation. Authoritative advice on equipment and installation methods to meet specific requirements will be furnished by the Pyle-National engineering staff.

The Pyle-National Company

1334-1358 N. Kostner Avenue ~ Chicago, Ill., U. S. A.

A4-5 Gray



WE REPEAT

"IT'S A GOOD ENGINE!"

TWO years ago, in advertising the Challenger, we said "It's a good engine." That was when the Challenger was a mere youngster, before it had been flown hundreds of thousands of hours in actual service.

Since then, the Challenger has been in continuous production under exacting Curtiss standards, in the country's largest and finest aircraft engine factory. It has been given the backing of a dealer and service organization that is nation-wide. It has been installed in hundreds of sport, commercial and training aircraft and won the affectionate regard of pilots, owners, and mechanics everywhere. It has established the World's Endurance Record with an amazing 420-hour performance.

And now it has become the 1930 Challenger, with a new U. S. Department of Commerce rating of 185 horsepower. It has attained new smoothness and quietness of operation, and new lower prices that are of keen interest to manufacturers and owners alike.

We repeat—"It's a good engine."

1930
CHALLENGER
• • •
NEW
POWER
•
NEW
SMOOTHNESS
•
NEW
PRICES

CURTISS AEROPLANE & MOTOR CO., Inc.

Offices: Garden City, N. Y. · Factories: Garden City, Buffalo, N. Y.

A DIVISION OF CURTISS-WRIGHT CORPORATION

ANOTHER MANUFACTURER IN THE AVIATION INDUSTRY THAT USES SKF BEARINGS

WRIGHT AERONAUTICAL CORPORATION

44 SKF BEARINGS ON WRIGHT WHIRLWIND FOR LOW COST SAFETY

FOR dependable, low cost air transportation to meet the demand of speeding up modern business, aviation motors must of necessity have a high degree of efficiency. Wright makes sure of the reliability of their 300 H. P. J-6 Whirlwind motors by using 44 SKF Bearings on the vital locations.

It can truly be said that the hour after hour reliability... day and night... which SKF Bearings bring to Wright motors is something not based on first cost. Ultimate performance after hundreds of hours in the air is the deciding factor. Reasoning in this manner Wright finds that "the highest priced bearing in the world", is really the cheapest.

SKF INDUSTRIES, INC., 40 East 34th Street, New York, N. Y. 2480

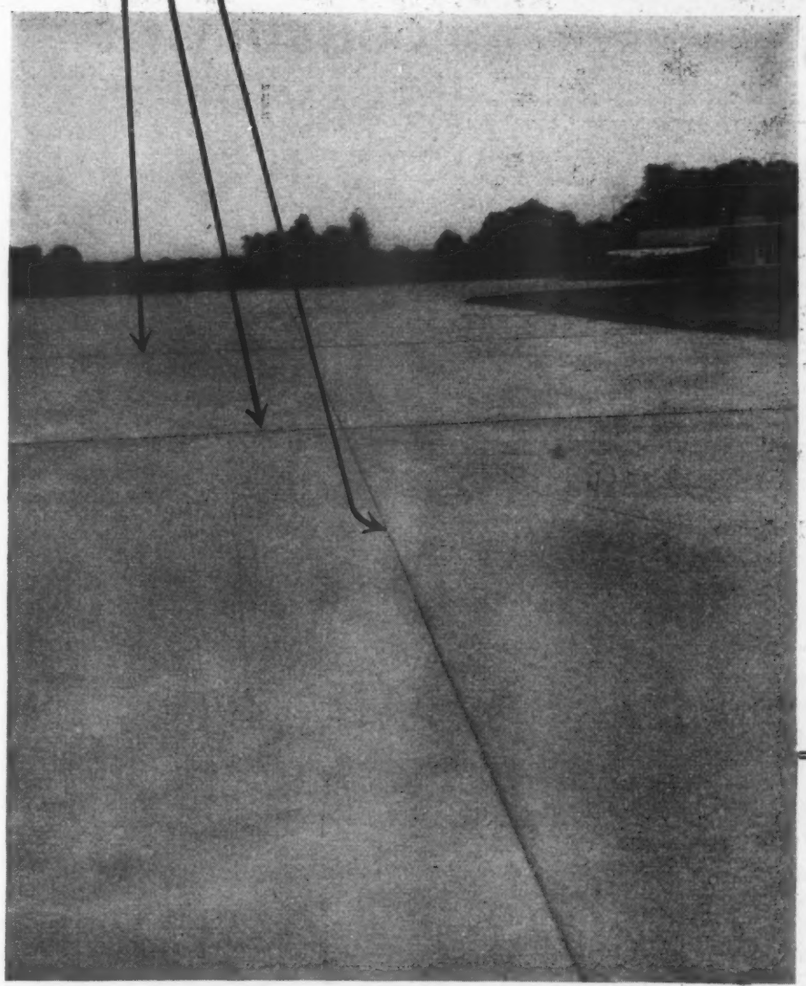
EQUIPPED WITH THE HIGHEST PRICED BEARING IN THE WORLD

Means just this

SKF
Ball and Roller Bearings

That the manufacturers whose product is illustrated above preferred to pay more for their bearings and less for servicing or replacing them. They preferred to pay a higher price in the beginning than many times this higher price in the end. And, finally, they preferred to economize by using SKF bearings because they are made to do their job, not to fit a price list.

Those are *Elastite* "sandwich" joints!



Permanently surface-smoothed, for better take-off and landing facilities. This concrete groundwork, at a large Michigan airport, is protected against expansion and contraction strains by Carey Elastite Expansion Joint.

Shock-absorbers, **built right into the concrete! Pioneer Carey "sandwich" joints—asphalt and fibre blends, between sheets of asphalt-saturated felt. They protect the concrete, perfectly and permanently, against expansion and contraction stresses and strains.**

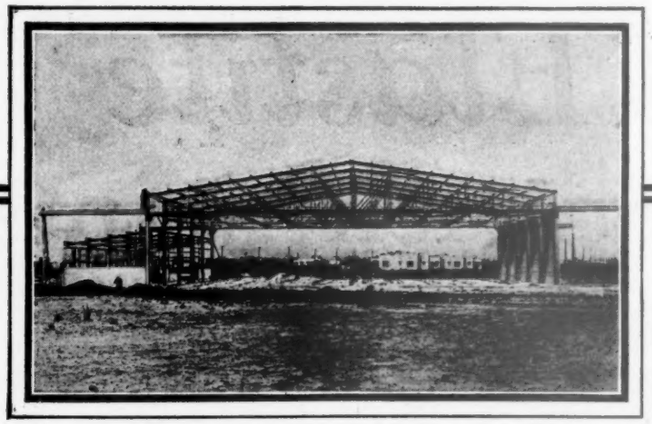
Airport properties everywhere are being given the lasting protection of Carey Elastite Expansion Joint. For runways and warming-up aprons, for taxi ways, sidewalks and hangar floors—to keep the concrete safely smooth. Write for particulars on Expansion Joint installation.

For Aviation Field Service:

Corrugated Asbestos Roofing and Siding, Carey Asbestos and Magnesia Heat Insulations, Carey Asbestos and Asphalt Built-up Roofing, Carey Elastite Asphalt Planking, Carey Elastite Asphalt Water-proofing.

THE PHILIP CAREY COMPANY ✦ *Lockland,* CINCINNATI, OHIO

Philip Carey Products



A hangar for the Pan-American Airways at Miami, in course of construction. Robertson engineers assisted in its erection.

A CONSULTING SERVICE IN HANGAR CONSTRUCTION . . .

Robertson *does* have the experience . . . and aviation needs every ounce of it . . . and the world needs aviation. So there is a certain feeling of responsibility in possessing one of the world's greatest funds of experience in hangar construction. It has to be regarded as a public trust. There is no room for ordinary commercial attitudes in it.

Therefore, the Robertson Company SHARES its experience. You can call upon Robertson engineers for any information you may need about hangar designs, about the proper materials to use, about costs, about lighting arrangements, and ventilation, and doors, and a hundred other aspects of the situation.

This information is open to anyone who is genuinely interested in construction of hangars. Just write what your problem is. There will be no charge for recommendations and no obligation to you.

H. H. ROBERTSON COMPANY
PITTSBURGH, PA.

ROBERTSON
has the Experience
. . and SHARES it

Same hangar as above, after completion

ROBERTSON
WORLD WIDE HPW **HANGAR BUILDING**
EXPERIENCE

●1930—H. H. Robertson

PROTECTION

IN the earliest days of man's existence one thought was

constantly uppermost in his mind—to protect himself—to protect his belongings.

Today manufacturing concerns must protect their products against the ravages of rust and corrosion.

UDYLITE plating is the best guarantor against rust and corrosive influences.

UDYLITE is the electrolytic application of cadmium to base metals for protection against rust

Udylite
RUST PROOFS
REG. U.S. PAT. OFF.

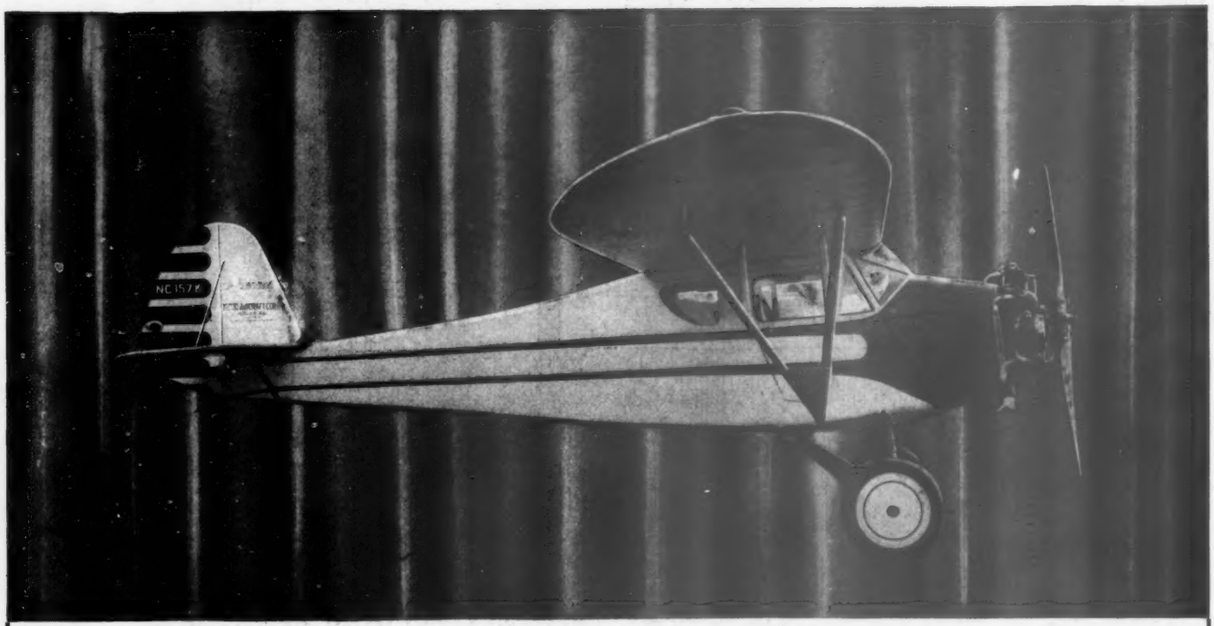
UDYLITE PROCESS COMPANY

Sales Office:
30 East 42nd St.
New York

3220 Bellevue Ave.
DETROIT
MICH.

Sales Office:
114 Sansome St.
San Francisco

UPC



New Super-Performance

Under All Conditions for

The Monocoupe "90"

at $3375.00

TAKE it point for point—a plane that is comfortable in all weather without getting dressed up to look funny. It's companionable—you can smoke and talk, no weather too rough, one man moves it in and out the hangar, a power plant that requires less concern over motor service and maintenance than one gives his automobile, one that you can rebuild after the second year for $75.00—with a landing speed of less than 37 miles an hour—guaranteed top speed of 120 miles an hour and a fuel cost of less than 1½ cents a mile—an initial cost far below anything on the market, and regardless of some of the queerest yarns, some of the Jenny experts who have never flown such an airplane tell, it is so easy to fly that it's almost a shame to take money for showing a prospect how to operate it.

The unprecedented popularity of the new design necessitates your order being placed at least three weeks in advance.

Monocoupe "90" Performance

High speed	120 M.P.H.
Landing speed	37 M.P.H.
Cruising speed	105 M.P.H.
Climb	1100 ft. per min.
Horse power	90
Length overall	20 ft. 5 in.
Span	32 ft. 0 in.
Cruising range	525 miles

$75.00 Buys

Parts for complete overhaul of Lambert R-266 Engine

- 5 Cylinder barrels
- 5 Pistons with rings fitted
- 10 Valve guides
- 10 Rocker arm bushings
- 10 Spark plugs
- Complete set of gaskets

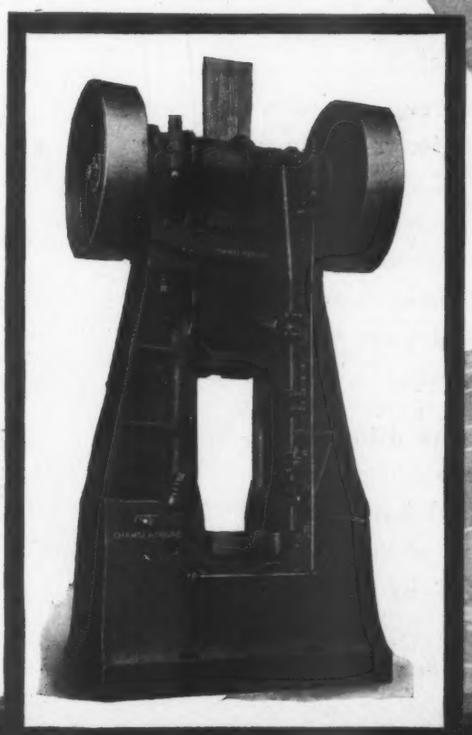
MONO AIRCRAFT CORPORATION

MOLINE, ILLINOIS

DROP FORGINGS FOR RELIABILITY

On Chambersburg Hammers

Every airplane part that must stand up under the constant grind of repeated service is a vital part. Vital parts such as these illustrated above naturally are drop forgings, and just as naturally were forged on Chambersburg Hammers.



Chambersburg Hammers have been used in the production of forged parts for many of the most important names in the automotive industry since its very beginning . . . And in aviation, the youngest branch of that industry, Chambersburg hammers are again associated with the most important names.

CHAMBERSBURG ENGINEERING COMPANY

CHAMBERSBURG . . . . . PENNA.

Sold by

CHAMBERSBURG-NATIONAL

COMPLETE FORGING EQUIPMENT

CHAMBERSBURG, PA. TIFFIN, OHIO

New York, 152 W. 42nd St. Chicago, 565 W. Washington St.

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CHAMBERSBURG HAMMERS

MEMBER OF AERONAUTICAL CHAMBER OF COMMERCE

CURTISS-WRIGHT GROUP
ADOPTS
BERRYLOID AIRCRAFT FINISHES 100%

✣

BERRY BROTHERS now fills all finishing requirements for the Curtiss-Wright group. This means that the Curtiss Aeroplane and Motor Company, Inc., Curtiss-Wright Flying Service, Curtiss Aeroplane Export Corporation, Curtiss-Robertson Airplane Manufacturing Company, Moth Aircraft Corporation, Keystone Aircraft Corporation, Travel Air Company and other associated units will use Berryloid Aircraft Finishes exclusively.

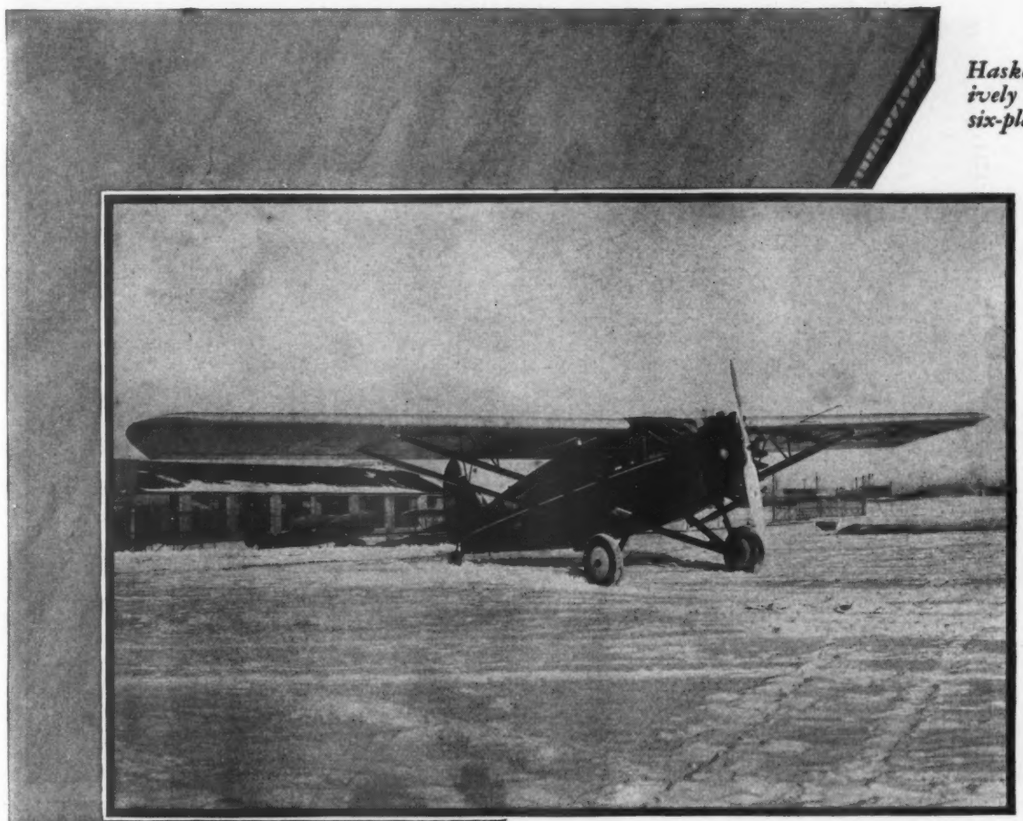
Selecting Berry Brothers in face of extreme competition Curtiss-Wright gave these points consideration:—1. Satisfaction Berryloid has given all units in the past; 2. Completeness of the Berryloid line; 3. Prompt service rendered by distributing points throughout the country; 4. Reputation and scientific research behind all Berry Brothers' finishes.

USE THE AIR MAIL AND TRAVEL BY AIR

BERRY BROTHERS, INC.
VARNISHES ENAMELS LACQUERS

DETROIT, MICHIGAN WALKERVILLE, ONT.

PROGRESSIVE AIRCRAFT FINISHES



Haskelite used exclusively in the Travel Air six-place cabin transport

PLYWOOD
HASKELITE
PLYMETL

Weatherability

Planes flying on schedule must stand up day after day—under all conditions of moisture and temperature.

It is a tribute, therefore, to Haskelite's weatherability that it is used in a majority of the country's transport and mail planes. No other plywood has equalled the water-resistance of this blood albumin plywood. Write for engineering data.

HASKELITE
MANUFACTURING CORPORATION
120 South La Salle St., Chicago, Ill.

Curtiss Flying Service

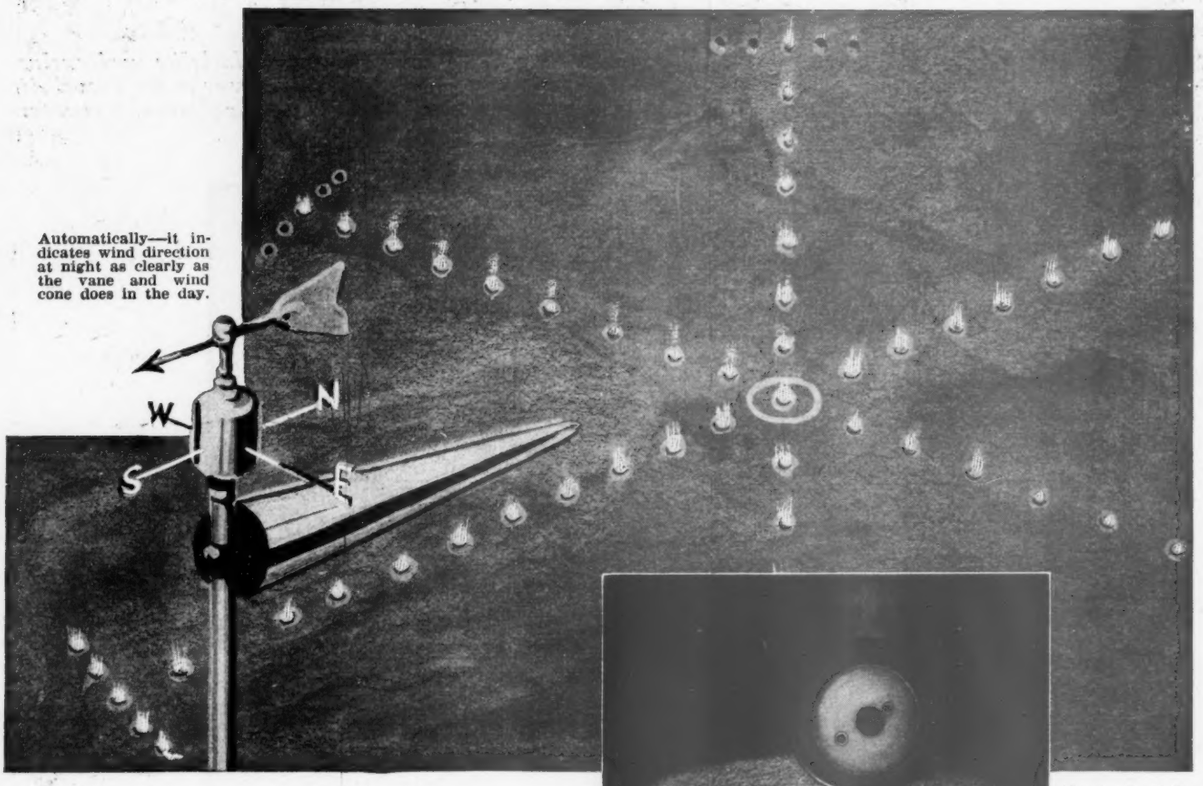
California Panel & Veneer Co.
Los Angeles, Calif.

Air Associates, Inc.
Garden City, L. I.

In Canada: Railway & Power Engineering Corporation, Ltd.

See the Haskelite exhibit at the Detroit Show—73 and 75 Lindbergh Airway

A 4-5-Gray



Automatically—it indicates wind direction at night as clearly as the vane and wind cone does in the day.

The lenses of the Automatic Night Lighting System unit have sufficient strength to take the impact of the wheels and tail-skid of the heaviest transport ship.

The Automatic NIGHT LIGHTING SYSTEM says:

"Land into the wind *on the dotted line*...."

HAILED by outstanding figures in the aviation world—as the greatest contribution to the safety of night flying—no airport, contemplated or established, can be termed truly modern without the factors of safety this new, simple, and efficient lighting system offers!

It comprises a series of lights, set flush in the ground, one hundred feet apart on the runways. At each end are flush lights fifty feet apart at right angles to the runway. These lights are automatically illuminated by the action of the wind on the wind vane. As the wind changes the correct landing direction is automatically indicated.

This System was selected for the Grosse Ile Airport at Detroit, Michigan—a division of the Detroit Aircraft Corporation—one of the largest and most modern airports in the World—after a careful consideration of *all* available systems! Learn more about it—write for particulars!

Advantages of the System Include:

- Indicates true ground level at all times.
- Automatic control.
- Indication of proper runway to land on.
- Indication of wind direction.
- Indication of runway length.
- Efficient under the most severe weather conditions.
- Shows drift of plane.
- Does not blind pilot—(diffused light)
- Low operating cost.
- Obstructionless (Flush Type).

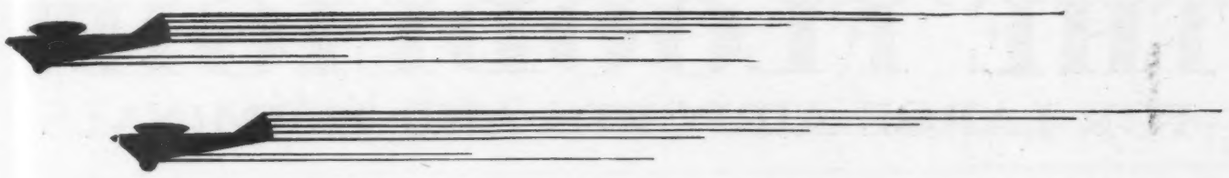
AIRPORT LIGHTING, Inc.

"Standardized Safety Lighting Equipment for all Airports"

10 East 40th Street, New York City

Commodore F. G. ERICSON, *Pres.* EDW. FROEDE, *Sec.-Treas.*

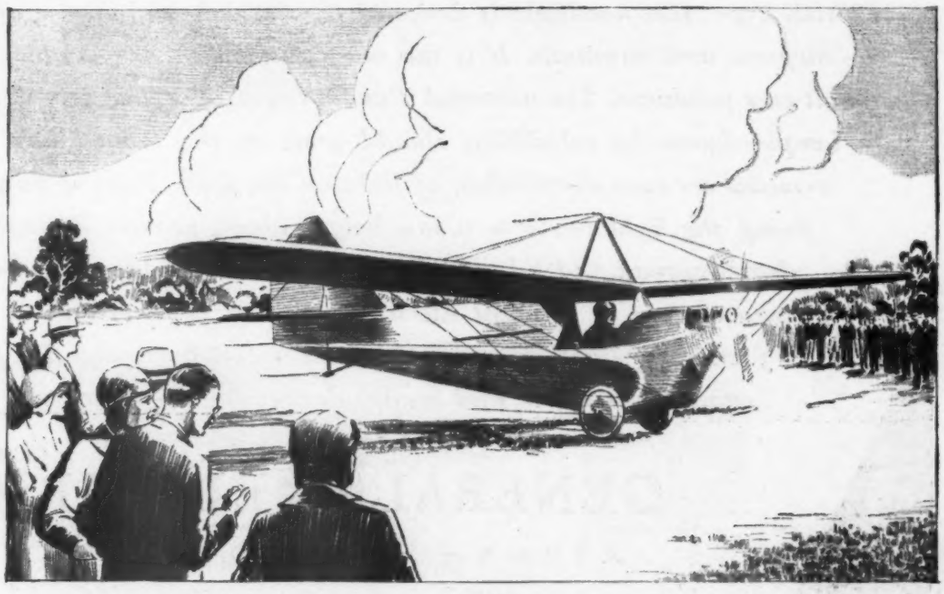
Don't Fail to Inspect Our Installation at Grosse Ile Airport During Your Visit at the All American Aircraft Show



AERONCA

SPECIFICATIONS

Span	36 feet
Cord	50 inches
Length overall	20 feet
Weight (empty)	375 lbs.
Weight (gross)	700 lbs.
Speed (cruising)	65 m.p.h.
Speed (high)	85 m.p.h.
Speed (stalling)	31 m.p.h.
Ceiling (service)	16,500 ft.
Motor	Aeronca E-107
Fuel Consumption	2 gal. per hr.



Take-off for official N. A. A. economy test. One hour and seventeen minutes on two gallons of gasoline.

The Most Talked of Plane in America Today

THE Aeronca C-2!! Two years ago this name had not even been born. Today it is making aviation history. In design the Aeronca C-2 is an innovation . . . a radical departure from conventional design. Instead of depending on tremendous power to pull it through the air, aerodynamic efficiency has been increased to the point where its 30 horsepower motor will make the Aeronca duplicate . . . and in many cases surpass . . . the performance of planes with three times as much power.

But, unlike other light planes, speed and maneuverability are combined with remarkable ease of handling and absolute inherent stability, regardless of weather conditions. Though a glider graduate can easily fly an Aeronca after a little instruction, the veteran pilot is even more enthusiastic because his experience enables him to appreciate its outstanding performance.

Lieut. Ralph Barnaby, the Navy's glider expert, declared the Aeronca to be the very *next step from a glider* because of its instant response to stick and rudder forces, its seventy-foot take-off and 30 mile an hour landing speed, and its remarkable eleven to one gliding angle.

On the other hand, such famous veterans as Frank Hawks, Clarence Chamberlain, Phil Love, Jimmy Doolittle, Eleanor Smith and others expressed the most genuine enthusiasm for the Aeronca's maneuverability, its rapid climb and the unprecedented feeling of confidence they absorbed . . . no matter what the position of the plane even when very close to the ground.

Compliments from such wide extremes are, alone, a big recommendation. But, to have achieved such a combination of glider safety and sport plane performance in a plane which is much lower in initial cost and *uses only sixty-five cents of fuel an hour* is an accomplishment that is destined to bring aviation to the thousands who could not afford to fly before.

Already some of the country's biggest aviation men can see its huge possibilities. The Issoudun Company, with Major Lamphier and Colonel Breckenridge, have taken over important territories. Russell Nicholas of Nicholas-Beazley is busy in the Mid-west and scores of others are arranging sales franchises. Thousands of letters from real prospects every month indicate the popular appeal and prove that the Aeronca C-2 is what the country has been waiting for—a plane which the average man can fly safely, buy easily and own proudly.

AERONAUTICAL CORPORATION OF AMERICA
LUNKEN AIRPORT . . . . . CINCINNATI, OHIO

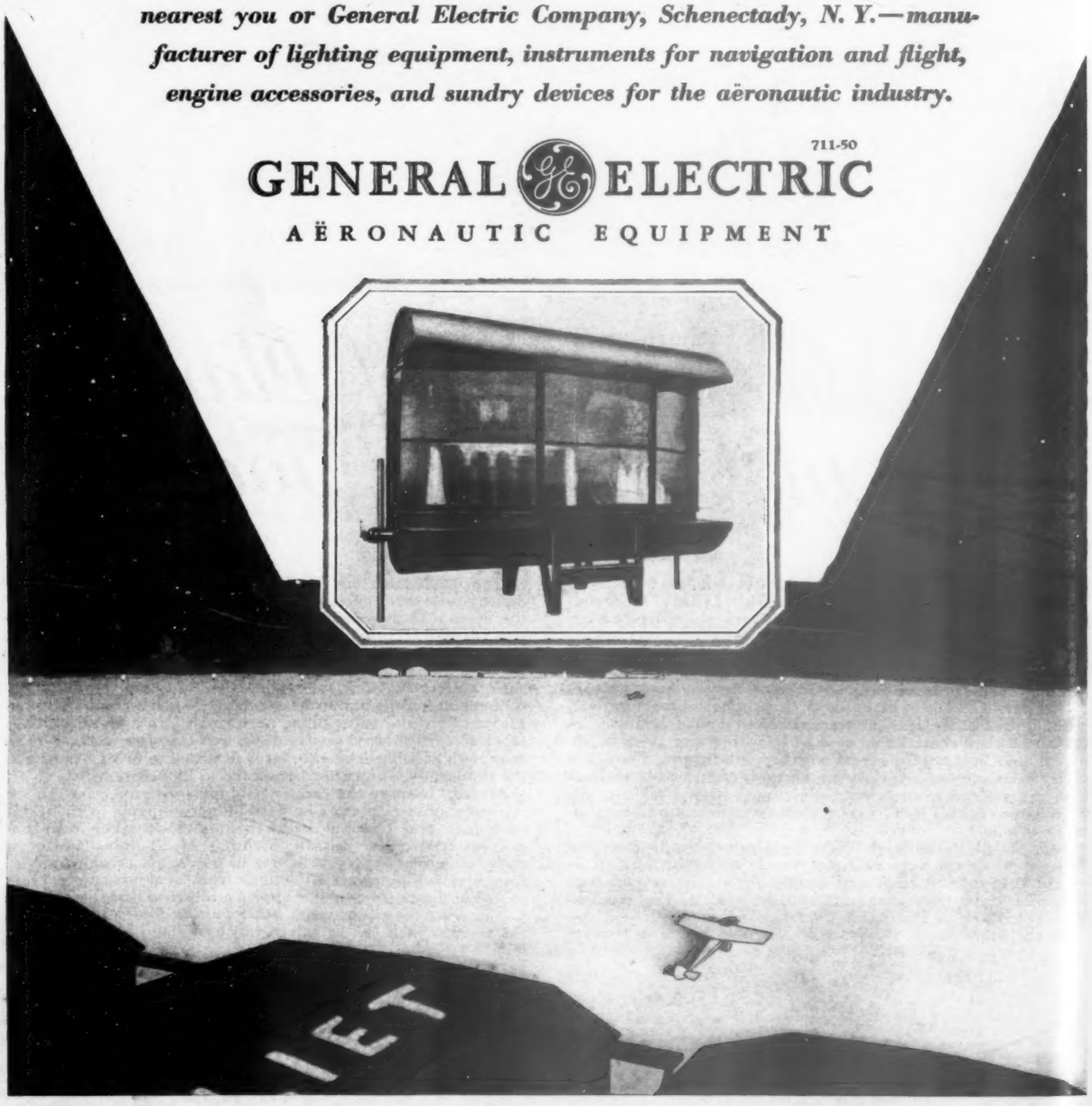
THE FLOODLIGHT
FOR LARGE AIRPORTS AND TERMINALS

THE Type ALH floodlight is designed for the definite purpose of illuminating large airports and terminals. It is the most powerful, most reliable, and most efficient unit ever produced. The powerful illumination is obtained from eight 3-kw. MAZDA lamps—hence its reliability; should some of the lamps burn out, there still remains an even distribution of light on the field. Glare is minimized by confining the light beam to a low height above ground throughout the 180-degree spread. ¶ Ask for complete information. Address the G-E sales office nearest you or General Electric Company, Schenectady, N. Y.—manufacturer of lighting equipment, instruments for navigation and flight, engine accessories, and sundry devices for the aëronautic industry.

711-50

GENERAL ELECTRIC

AËRONAUTIC EQUIPMENT



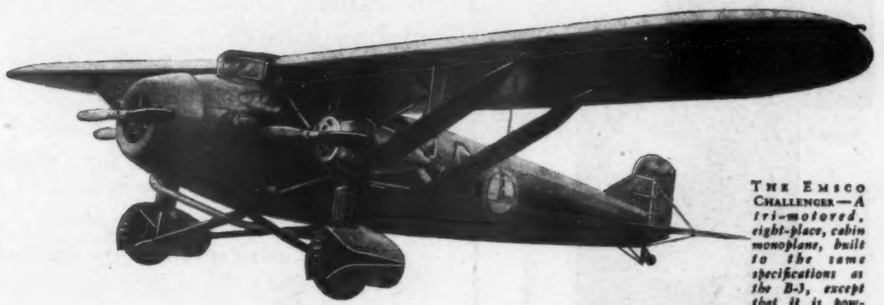
LIGHT WILL PUT YOUR AIRPORT ON THE NIGHT MAP OF AMERICA

EMSCO

A COMPLETE LINE OF AIRCRAFT FOR LAND AND SEA

THE EMSCO CIRRUS—*A two-place, sport and training, mid-wing monoplane, powered with a 95 h.p., four-cylinder, air-cooled American Cirrus motor.*

THE EMSCO B-3—*A single motored, eight-place, cabin monoplane transport that may be powered with a Wright 300, a Pratt & Whitney Wasp or Hornet engine.*



THE EMSCO CHALLENGER—*A tri-motored, eight-place, cabin monoplane, built to the same specifications as the B-3, except that it is powered with three Curtiss Challenger engines of 170 h.p. each.*

EACH A LEADER IN ITS CLASS

Engineered on sound principles that have been proven by years of experience in commercial and military aeronautics.... Built by master craftsmen in a new $1,000,000 factory equipped with the most modern approved production methods.... These three types of Emsco Aircraft are proving every day their superiority in providing safe air transportation with greatest economy.

The Emsco Cirrus has flown cross-country under normal flying conditions with a fuel consumption of only 4.8 gallons per hour at cruising speed. Twice the 3-B, powered with a 300 h.p. Wright Whirlwind has taken off a gross load of approximately 10,000 pounds with a run of a half mile. The Emsco Challenger has demonstrated its dependability, safety and economy by flying more than 25,000 miles under all conditions, within the last four months.

In addition to these, the Emsco Aircraft Corporation has under construction at this time four new and distinctive types of planes, which, when completed and added to the present group, will make the Emsco line one of the finest and most complete in the industry today. These four include:

(1) a four motored plane carrying thirty-two passengers, two pilots and radio man; four Wasp motors—tandem; designed for all weather conditions and altitude flying, also offering economical transportation.

(2) The Emsco Amphibian—a bi-motored eight place, streamline; metal designed; built for heavy duty transportation.

(3) The Emsco Mail—a single motored monoplane; built for mail, express and freight; fast performance with a pay load of 1200 pounds.

(4) A special long range monoplane—extremely streamlined; designed for record distance flight.

All Emsco land planes are delivered from the factory with pontoon fittings so that no structural changes are necessary to quickly adapt them to seaplane work. The B-3 may easily be transformed into a tri-motored plane as fittings for outboard motors are standard. Structurally the planes are identical.

Complete specifications, performance data and prices will be forwarded on request.

EMSCO AIRCRAFT CORPORATION ◆ DOWNEY ◆ LOS ANGELES COUNTY ◆ CALIF.

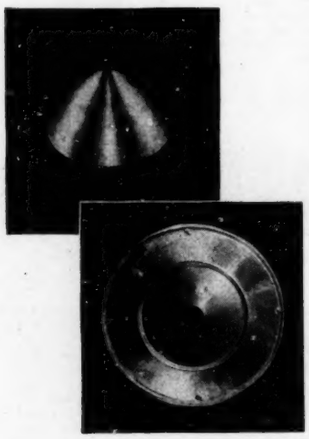
Tanks and Cowlings Built to Specifications

THERE is no substitute for dependability in airplane construction. Every unit must bear its share of the loads and stresses with a margin of safety. This is the principle upon which we have built our tank and cowling business.

Stuart tanks and cowlings have never failed because they are carefully welded of the best materials, by experienced workmen, under executive supervision and inspection.

That's why many of the largest aircraft manufacturers have specified Stuart tanks and cowlings for their finest models.

Send blue-prints for estimate.

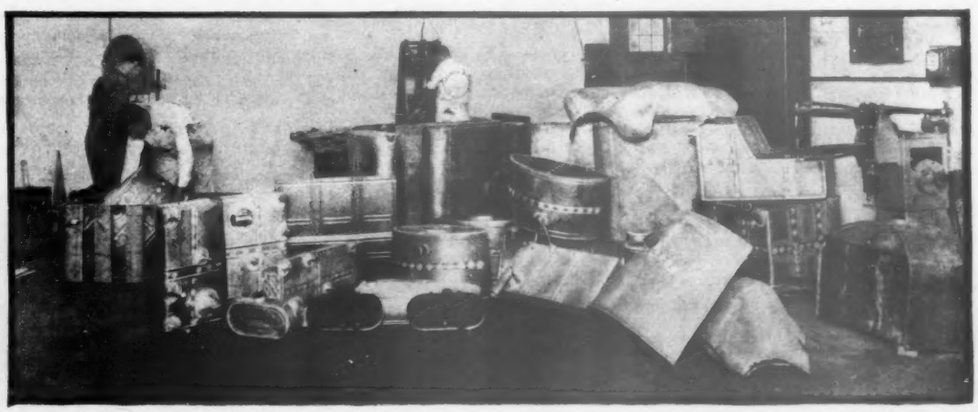


STUART AERO PRODUCTS, Inc.

Manufacturers Tanks, Cowlings and Motor Parts
Thirteenth and Rutger Streets
ST. LOUIS, MO.

In addition to manufacturing tanks and cowlings we make an extensive line of airplane motor parts which we offer at lower prices than the production costs of individual manufacturers.

Write for complete list and prices.



ANNOUNCING

THE CHAMBERLIN 8-SEATER

Designed by

Col. CLARENCE D. CHAMBERLIN

Built by

CRESCENT AIRCRAFT CORP.,

Jersey City, N. J.

REVOLUTIONARY—
STARTLING SAFETY FEATURES

It is my conviction that this 7 pay passenger plane with a Wright Whirlwind J6 or Wasp Jr. motor is safer than a multi-motor and the plane that can make air transport profitable.

The visibility, stability and maneuverability of the Chamberlin 8-Seater are beyond comparison. Its comfort, control and practical operating features are remarkable. Its wing has non-stalling characteristics without use of slot mechanism

Designed from the pilot's and operator's viewpoint—engineered by experts—built by an experienced organization, it is the coming type for transport lines as well as for sight-seeing and "taxi" service.

See it—fly it yourself. Its performance will be a distinct surprise to you.

Clarence D. Chamberlin

President

CRESCENT AIRCRAFT CORPORATION

Bergen 7330 — Jersey City, N. J. — 372 Lembeck Ave.

Adjoining Jersey City Airport

SPECIFICATIONS

Length.....28 ft. 6 inches
Span .....48 ft. 0 inches
Weight .....4,440 lbs.
Pay Load.....1,260 lbs.
Gasoline Capacity ..90 gals.
Cruising Speed.....
110-120 M.P.H.

Equipment

Toilet and Luggage Compartment
Brakes
Lights
Tail Wheel or Tail Skid
Metal Propeller
Starter
Instruments and other standard equipment

Exceptional Dealer and Distributor assistance not available with any other plane.

New Low Prices!

Inland Supersport with Warner Scarab Motor

$4,985

Inland Sport with LeBlond "60" Motor

$3,485

A thousand dollar price reduction on the Inland Supersport is the month's best news! Now you can own this speedy little ship for less than five thousand dollars . . . fly it as economically as you can run a motor car.

Inland Sport is "tomorrow's plane today"—an airworthy ship of outstanding performance, with an American altitude record and the world's speed record for light aircraft already to its credit.

Inland Sport pioneered side-by-side seating to bring greater comfort and the pleasure of human companionship to open cockpit flying. Pilot and passenger can talk face-to-face . . . discuss maps, controls, instruments . . . converse almost as easily as in a motor car. This arrangement is a decided advantage in training, with instructor and student seated side-by-side.

Further details gladly sent on request.

INLAND SPORT

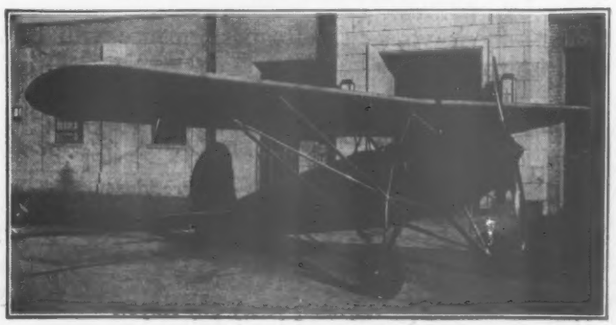
INLAND AVIATION COMPANY

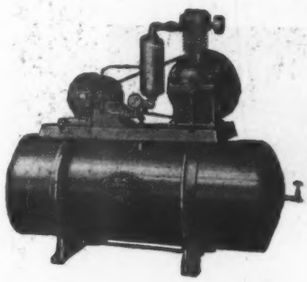
Fairfax Field KANSAS CITY, KAN.

INLAND SPORT MONOPLANE

TOMORROW'S PLANE TODAY

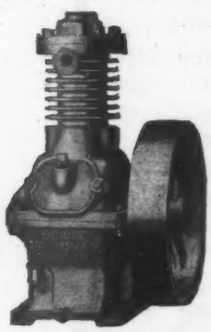
Manufactured at Fairfax Field under Approved Type Certificate No. 259





Model F-2

Air cooled and designed especially for service where a large volume of air is required, as for paint spray work, engine cleaning and similar work. Supplied also in portable form. 150 lbs. cut off pressure. Displacement 6 cu. ft. with 1 H.P. motor; 8.6 cu.ft. with 1 ½ H.P. motor.



Model A

An air cooled compressor made in 8 sizes, with displacements ranging from 1 to 27 cu. ft. per minute and requiring motors of from ¼ H.P. to 5 H.P. "V" type drive furnished as regular equipment, when desired.

Air for Airplanes

Before you purchase that air compressor for operating spray gun—for cleaning engines and planes—for tire inflation—for general shop work—be sure to consider carefully every feature of Quincy Compressors.

Here is a compressor line of 14 sizes, air cooled and water cooled, from which to select the exactly right compressor for your needs.

Quincy Compressors

are designed and built to deliver air at the lowest possible cost for power and maintenance.

They are rugged and long lived; and so quiet in operation that one is hardly aware of their presence.

Quincy Compressors are not "cheap"; they're "good."

Send the coupon for full details.

Quincy Compressor Co.,
208 Maine St., Quincy, Ill.

Please send details about Quincy Compressors.

Name .....

Address .....

City ..... State .....

QUINCY Compressors

208 MAINE ST.
Quincy, Illinois

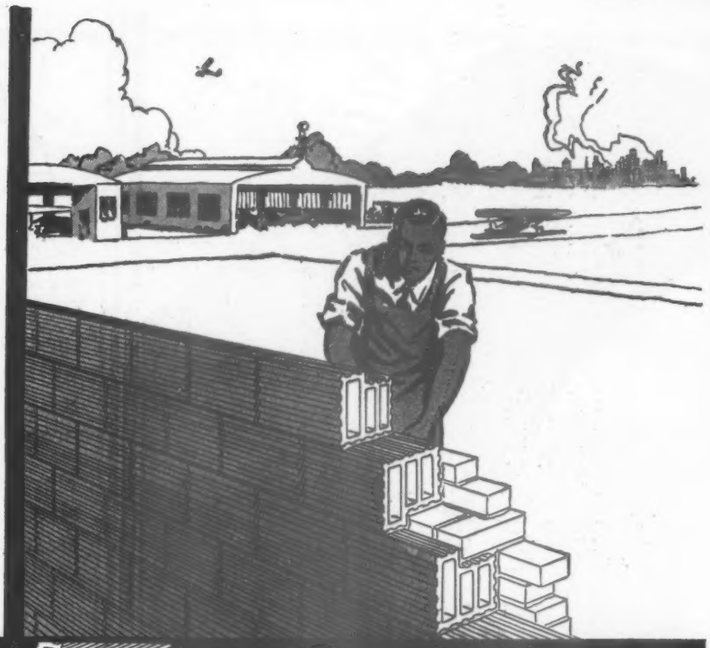
N1049

SERVICE AND SALES OFFICES

Atlanta, Ga.	Houston, Texas
Birmingham, Ala.	Kansas City, Mo.
Boston, Mass.	Memphis, Tenn.
Buffalo, N. Y.	Moline, Ill.
Chicago, Ill.	Newark, N. J.
Cincinnati, Ohio	New Orleans, La.
Cleveland, Ohio	St. Louis, Mo.
Dallas, Texas	Waco, Texas
Detroit, Mich.	Washington, D. C.

Also in other important centers

HOLD BUILDING COSTS DOWN WITH NATCO UNIBACKER



Face your airport buildings with brick, if you will—but back the walls with Natco Unibacker. You will save weight without sacrificing strength; you will save time without sacrificing durability; you will save money without sacrificing permanence.

Available in various sizes for various thicknesses of walls, Natco Unibacker every six courses, establishes a bond with the brick work, so intimate that the facing becomes an integral part of the wall. Building codes recognize the strength of this bond by permitting bearing value to be figured on full wall thickness.

Natco Unibacker, in common with all of the Natco line, offers you:

1. FIRE SAFETY—Natco Structural Clay Tile are absolutely non-inflammable. They help confine a fire and permit a maximum of salvage.

2. ECONOMY—The large, easily handled units are laid at sizable savings in time, labor, mortar and expense.

3. SPEEDY CONSTRUCTION—Each Natco Tile is equivalent in volume to several brick. Structures go up in a hurry, are quickly ready for use.

4. PERMANENCE—Natco Tile are permanent in character and form; never rust, rot, or warp.

5. LOW MAINTENANCE—Painting, patching and repair work, necessary with most forms of construction, are reduced to an absolute minimum.

6. LOW DEPRECIATION—Buildings built of Natco Structural Clay Tile are highly resistive to destruction and decay. Depreciation is usually figured at ½% a year.

7. DECREASED HEAT LOSS—All Natco Structural Clay Tile have high insulating value. Dead air spaces retard heat and cold to a great degree.

NATCO
THE *COMPLETE* LINE *of*
STRUCTURAL CLAY TILE

NATIONAL · FIREPROOFING · CORPORATION

THE LARGEST CONCERN IN THE WORLD MAKING A COMPLETE LINE OF STRUCTURAL CLAY PRODUCTS

GENERAL OFFICES: FULTON BUILDING, PITTSBURGH, PA. BRANCHES: NEW YORK, CHANIN BUILDING; CHICAGO, PULLER BUILDING; PHILADELPHIA, LAND TITLE BUILDING; BOSTON, TEXTILE BUILDING — NATIONAL FIRE PROOFING COMPANY OF CANADA, LTD., TORONTO, ONTARIO

SAFETY CHUTE

THE ACE OF PARACHUTES

Every Pilot Should Own a SAFETY CHUTE

Smaller . . Lighter . . More Compact . . Comfortable . . The most modern fool-proof pack in the world today.

Get a Safety Chute for your constant flying companion. Take it with you on every flight and you can laugh at Old Man Trouble.

As comfortable to wear as your flying suit, with a one piece pack cover that is absolutely fool-proof . . . and a positive triple opening action direct from the rip—Just pull the ring and the Safety Chute snaps instantly into action . . . of proven quicker opening. We have a special offer to pilots. . . . Write for information.

We Also Manufacture

SNAPPY-SNUG FLYING CLOTHES

Helmets - Masks - Wind Cones

Commerce Officials and Many Famous Flyers Safety Chutes Are Used By Department of

SWITLIK PARACHUTE & EQUIPMENT CO.

TRENTON, NEW JERSEY

WE BUY A PLANE ... WHY?

EARLY this year a six-place cabin plane was purchased and put into operation by the Greenfield Tap & Die Corporation. Our Reasons: First, that a modern business can no longer afford to ignore the many practical advantages of air travel. And second, that we can manufacture better tools for the aviation industry if we have real knowledge of the industry's needs—such knowledge as can only be gained by extensive personal experience.

* * * * * * * * * *

The *Greenfield* plane will be at Detroit during the latter part of the All-American Air Show. Our friends both within and without the industry will be made welcome.

GREENFIELD TAP AND DIE CORPORATION
GREENFIELD, MASS., U.S.A.

New York: 15 Warren Street
Chicago: 611 W. Washington Blvd. Detroit: 228 Congress St., W.
Canadian Plant: Greenfield Tap & Die Corp. of Canada, Ltd., Galt, Ontario
Taps, Dies, Twist Drills, Reamers, Screw Plates, Gages, Pipe Tools, Machine Tools.

The Lockheed "REGISTER"

SINCE JANUARY 1, 1930

the following distinguished persons and corporations in the United States and abroad have taken delivery of or have placed orders for new Lockheeds:

COLONEL CHARLES A. LINDBERGH

AMELIA EARHART

LIEUTENANT JAMES DOOLITTLE
Shell Petroleum Corporation

COLONEL ARTHUR C. GOEBEL

LIEUTENANT A. HAROLD BROMLEY
for the Tacoma Chamber of Commerce

GENERAL ROBERTO FIERRO
Director of Civil Aviation, Mexican Government

CAPTAIN JOHN A. MacCREADY
Shell Oil Company of California

JOHANNA FAY SHANKLE of Boston

MONSIGNOR E. G. EORDOGH
for the Hungarian-American Ocean Flight

ASA CANDLER, JR., of Atlanta

JOHN HENRY MEARS of New York

ALASKA-WASHINGTON AIRWAYS
Seattle (two planes)

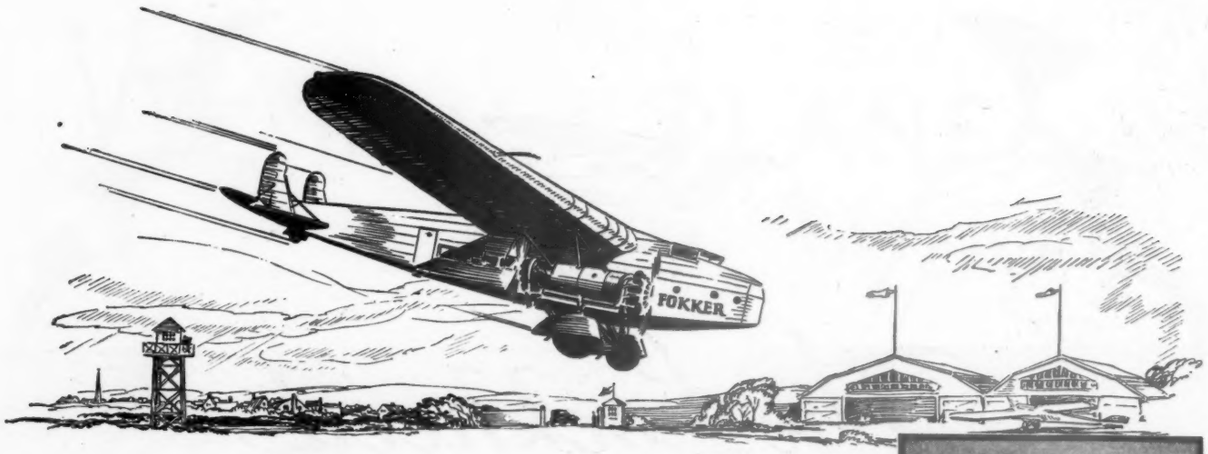
NEW YORK, RIO & BUENOS AIRES LINE, INC. (two planes)

DETROIT AIRCRAFT

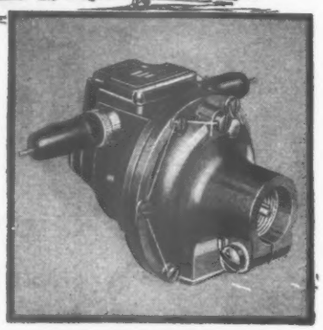
FORT AND CAMPAU STREETS, DETROIT

CHANIN BLDG., NEW YORK • ROOSEVELT BLDG., LOS ANGELES

LOCKHEED AIRCRAFT CORPORATION
EASTMAN AIRCRAFT CORPORATION
RYAN AIRCRAFT CORPORATION
AIRCRAFT PARTS CO., INCORPORATED
PARKS AIR COLLEGE, INCORPORATED
PARKS AIRCRAFT CORPORATION
BLACKBURN AIRCRAFT CORPORATION
AIRCRAFT DEVELOPMENT CORPORATION
MARINE AIRCRAFT CORPORATION
GROSSE ILE AIRPORT, INCORPORATED
GLIDERS, INCORPORATED
DETROIT AIRCRAFT EXPORT CORP.



~ ~ Dependable Speed Indication



Model 544 Magneto

WATCHING the performance of aircraft engines by listening to their roar, or noting their speed on indicators located outside the cockpit, is an unwarranted distraction for the pilot.

It is now possible by means of a recent Weston development for the pilot to note the speed of engines instantly, easily and with electrical certainty by the simple expedient of watching an indicator mounted on the instrument panel.

The instrument which Weston offers for this service is known as Model 544 Electric Tachometer.

The principle is not new. It has been applied with marked success for many years in Weston Tachometers for speed measurements in laboratories, industry and railway and marine fields.

The Model 544 is now in daily service on many passenger and mail planes. It is contributing a most important service by giving timely warning of fluctuations in engine speeds, helping to insure flight safety and providing another scientific unit for effecting complete and positive instrument flying control.

The Model 544 is a small refined generator screwed directly onto the Tachometer coupling on the engine. The voltage generated is transmitted by cables to an indicator, scaled to read in R. P. M. located on the instrument panel. It is easy to install and requires practically no lubrication or attention of any kind.

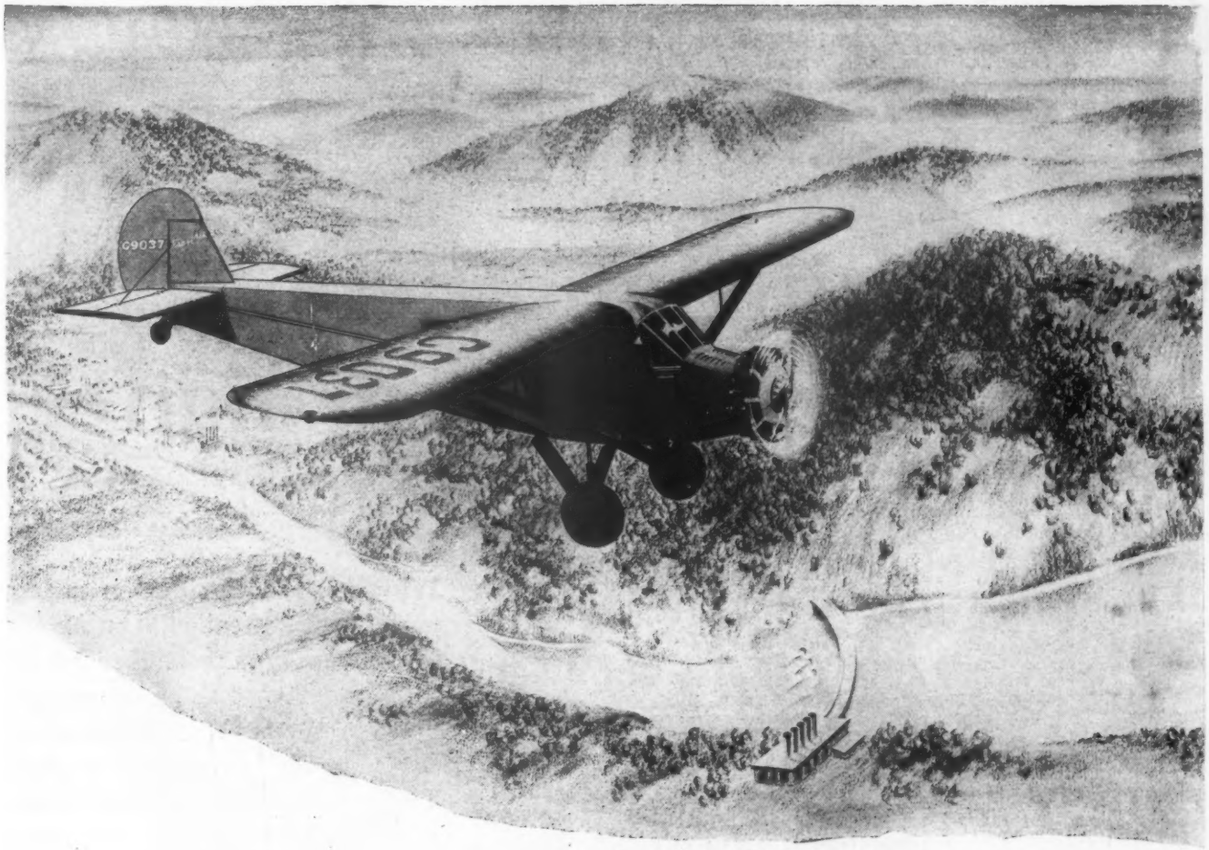
For complete details write for D. S. 544

WESTON ELECTRICAL INSTRUMENT CORPORATION,
616 Frelinghuysen Avenue, Newark, N. J.

Model 269 Indicator. Wide angle or fan-shape type. Black dial, luminous markings and pointer.

Weston
PIONEERS SINCE 1888
INSTRUMENTS

Model 301 Indicator, with black dial and luminous markings and pointer. Aircraft bakelite case.



They used to *read* reports

THE directors of Central Interstate Utilities, Inc., faced a difficult, but not uncommon problem. Their seventeen operating properties lay scattered through eleven states—seventeen colored markers on a map. Diversification? Yes. Close personal supervision? Well, hardly.

Then the company bought a Travel Air. Supervision became an actuality. Three, sometimes four properties can now be visited in a single day. The entire holdings of the company can easily be inspected by the directors in a week. They used to read reports. Now they make them.

The Travel Air six passenger cabin monoplane is eminently fitted to the requirements of flying executives and directors. In addition to inspection trips, it can be put to many uses in any business. Handsomely equipped, powered with the 300 h.p. Wright Whirlwind engine, it gives speed, prestige and privacy to urgent missions. Cruising at a speed of almost two miles a minute, the Travel Air monoplane has a range of 430 miles. Another model, powered with a 420 h.p. engine, has even higher speed and longer range.

Owners of Travel Air planes have the further advantage of always being within easy reach of the nation-wide organization of Curtiss-Wright distributors and airports where necessary parts and repairs may be had by Curtiss-Wright trained mechanicians.

* * *

Planes in Business. Travel Air has equipped so many progressive concerns with these luxurious planes that it can supply reliable data on the low operating cost and on the business economies which have been effected. For full information, write Department T-73

TRAVEL AIR COMPANY
Division of CURTISS-WRIGHT
27 West 57th Street · New York

TRAVEL AIR
A PLANE FOR EVERY PURPOSE

This is one of a series of advertisements directed originally to advertising men in an effort to make industrial advertising more profitable to buyer and seller. It is printed in these pages as an indication to readers that McGraw-Hill publishing standards mean advertising effectiveness as well as editorial virility.

Squelching another whispering campaign—

"Look out for that company, it's slipping," said the whisperers. Its product, an assembled unit sold to manufacturers to build into their machines, was of high quality but had been sold only through salesmen and direct mail.

Sales *were* falling off. The market, conscious of the gossip, was suspicious of the financial strength of the seller. This increasing sales resistance was undermining the morale of the sales staff.

With this serious situation facing it, the company called in an advertising agent who recommended an emergency advertising campaign in a McGraw-Hill publication covering the particular market. The program, the first publication advertising ever used by this company, consisted of color spreads in every issue.

That was only a year ago. Today, as evidence of the company's comeback, sales are not only mounting but the advertiser's chief competitor has offered to sell out to the new advertiser. *From bottom place to top position in recognition in one year.*

MORAL: Selling is not a choice between salesmen, publication advertising and direct mail but a matter of co-ordinating all three and using each on a basis of the job to be done.

McGRAW-HILL PUBLICATIONS

New York Chicago Cleveland Detroit Philadelphia St. Louis
Greenville San Francisco Boston London

MOTO METER AVIATION INSTRUMENTS

ICE WARNING
INDICATOR
Model CA ...$30.00

HEAT INDICATOR
Model 3015-A, $12.50

This trio of dependable and unfailingly accurate instruments have found wide favor in aviation circles. Because of their sterling performance Moto Meter aviation gauges have been chosen time and again to accompany outstanding flyers, such as Lindbergh, Byrd and Chamberlin, on their record-breaking exploits.

OIL PRESSURE
GAUGE
Model 2893-A..$2.50

FUEL PRESSURE
GAUGE
Model 2894-A..$2.50

Another Danger Loses its Terror

ICE on the wings! A danger no pilot likes to contemplate. The increased weight and changed wing contour means less lift, the possibility of a washout or a forced landing. Schedules are disrupted, profits reduced.

There is no positive means of preventing the formation of ice. You can't walk out on the wings and chip it off. The thing to do, is, of course, to change course or altitude until you are out of the danger zone.

To do that it is necessary to have an instrument that will give warning when the temperature falls to the critical point which, in a saturated atmosphere, means condensation. For this purpose the Moto Meter Ice Warning Indicator has been developed.

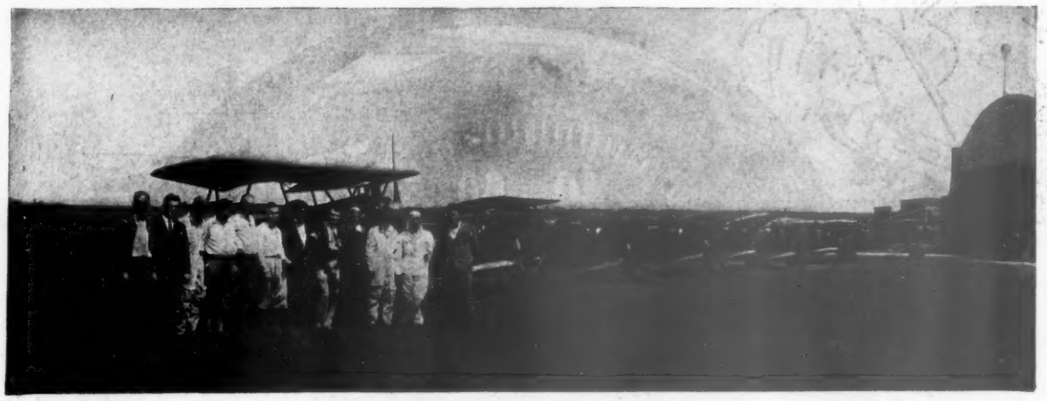
This sturdy, efficient instrument tells at a glance the outside air temperature—information that is doubly important in modern cabin jobs. It is as accurate and reliable as the experience, resources and facilities of the Moto Meter Corporation can make it—which is saying quite a bit.

MOTO METER

GAUGE & EQUIPMENT CORPORATION

LONG ISLAND CITY, NEW YORK, U. S. A.
TOLEDO, OHIO LA CROSSE, WIS.

Factories at Long Island City . Toledo . La Crosse . Canada . England
France . Germany . Australia



THE MEN SHOWN ABOVE (FROM SIX STATES) PURCHASED ARROWS AND LEARNED TO FLY—FREE

ARROW SPORT "60"	ARROW SPORT "90"	ARROW TANGERINE	ARROW PURSUIT
60 H.P. LeBlond	90 H.P. LeBlond	90 H.P. Lambert	100 H.P. KINNER
$3131.00	$3535.00	$3535.00	$3995.00

AN opportunity of a lifetime — free flying instruction! America's leading manufacturer of training and sport planes, together with direct factory representatives, offer FREE FLYING INSTRUCTION, with the purchase of an Arrow. Not just dual Instruction—but—a complete Private License Pilot Course with training under the finest of flight instructors.

The Arrow is everything you can ask of a training Plane. Safe—dependable—economical—staunch—airworthy—flashing speed—satisfying stamina. Side by side seating arrangement makes for easy training. Brilliance of performance is outstanding.

Every company shown on the list at the right employ only experienced accredited instructors. Jump on the "band wagon"—make up your mind to accept this unprecedented offer. Better still—write or wire direct to the factory and get more information. Don't put it off—write at once—today.

Arrow Instruction Fields

Northwest Air Service, Inc.
Seattle, Washington.

C. Ed. Line,
Carlsbad, California.

Arrow Sport Airplanes,
Pasadena, California.

L. E. Regan,
Shawnee, Oklahoma.

Arrow Flying Service, Inc.,
Lincoln, Nebraska.

Saunders Fly It Yourself System, Inc.,
Kansas City, Kansas.

Fergus Falls Air Service,
Fergus Falls, Minnesota.

Edwards Motors Corporation,
Lexington, Kentucky.

Harry I. Day & Associates,
Roosevelt Field, Long Island.

North Shore Airways.
Chelsea, Massachusetts.

Herington Airway,
Herington, Kansas

Eckerson Flying Service,
Medford, Oregon.

Nelson Story III,
Bozeman, Montana.

Your flying school can make you money! Let us show you how to do it. Write for full details of a positive profit making service. We will show how your school can be placed in the big money making class.

THE ARROW AIRCRAFT

ARROW AIRCRAFT AND MOTORS CORPORATION
Havelock, Nebraska

Quick and Sure
with only half the shock

Decide how much your life is worth. Compare this price with the price of a parachute. If your life is worth the most—get a parachute.

If not—don't!

Ten years of intensive development work by E. L. Hoffman, recognized world authority on parachutes, has made possible the remarkable action shown in the motion picture film enlargements on this page. The actual elapsed time between the top and bottom photographs is one and one twelfth seconds. But—even more remarkable—is the fact that this almost instantaneous opening action has been attained with *less than half the shock* to the jumper. Chief among the causes of this quick opening action is an entirely new design of pilot chute which weighs less and pulls more than any other type of pilot chute in use. A new method of ejection throws it five feet clear of the pack, independent of the force of pull on the rip cord.

An advanced design of pack and pack release method adds materially to the speed of opening. The suspension line retainers allow the lines to come out easily at any angle of pull yet hold them in so they must pay out in the proper order. Figure 2 shows the action of the specially designed skirt hesitator. This arrangement insures proper stringing out of canopy so that the air stream can get into the mouth of the chute and fill it quickly, this prevents the chute from coming out of the pack in a wad, causing delayed opening or fouling due to entanglement of suspension lines with canopy.

The construction and shape of the canopy leaves part of the skirt free to catch the air even when the pilot 'chute is pulling hard against the load at opening. An unprecedented canopy design spins out any twists in the lines sure and quickly.

Other advantages of the Hoffman Triangle Parachute are:

(1) Exceedingly low shock on opening. This fact has been ascertained by actual dynamometer tests. Less than half the shock experienced in most other chutes results from the opening of the Triangle chute.

(2) Excess strength margin shown by test drops made with 1200 pounds of lead. Such strength has been made possible by the new method of canopy construction and bracing and the new way of attaching suspension lines to develop the full strength of the line and allow adjustment of pull at any angle.

(3) Low rate of descent has been achieved through wind tunnel experiments which prove that the Triangle shape in sizes ranging from twenty-four inch models up to the 5000 square foot airplane chute has a greater lift than any other shape in use. Standing up landings are not at all unusual.

(4) The lack of oscilliation definitely eliminates the danger of breaking a leg or wrenching your back by landing when swinging like a pendulum.

(5) The Triangle Chute always moves away from the tail over the right shoulder and can be turned to right or left by pulling on the risers over the left shoulder. A man can never land backwards with this arrangement.

(6) The stainless steel fittings or advance design are the only nonmagnetic fittings in use. The fasteners are so designed that they can be opened with cold, gloved hands.

(7) The harness and pack arrangement is vastly more comfortable in both the walking and sitting positions than that found on other chutes.

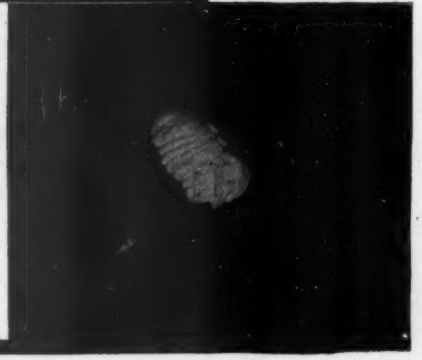
All of these advantages were scientifically developed by E. L. Hoffman and proven by thoroughly testing under conditions far more severe than can ever come in service. We shall be glad to send you the free booklet, "What to look for when buying a parachute and why," by E. L. Hoffman, Collier Trophy Winner and recognized world authority on parachutes.

Patents on all features applied for in United States and Foreign countries. Cost—no higher than that of the ordinary chute for the best in the world today.

ASK ABOUT OUR EASY PAYMENT PLAN.

Completely equipped service department for all types of chutes. The perfected Triangle harness, fasteners, pack, pilot chute and quick attachable mechanism applied to other chutes at factory. :: Chutes rented by day or week.

A new and better airplane SAFETY BELT designed by E. L. Hoffman is now available. Absolutely secure in use, yet quickly and easily released much simpler and easier to adjust. Warns you when unfastened in flight. It is always out of the way when entering or leaving the ship.



The TRIANGLE PARACHUTE CO.
GLOBE-WERNICKE BUILDING, CINCINNATI, OHIO

POSITIVE PROTECTION . . . FROM FIRE

(Exterior of hangar.)

for THE NEW DETROIT MUNICIPAL HANGAR

(Interior of hangar.)

IN THE new Detroit Municipal Hangar, complete protection from fire is assured by the installation of the Hangar Deluge System —a modern system specifically designed to combat fires in airplane hangars.

When you attend the Detroit Aviation Show at the Municipal Hangar, look for the red sprinkler pipes at the ceiling, and the sprinklers in the floor. Notice, too, the batteries of "Automatic" Deluge Valves along the center columns of the hangar. These sixty-four Deluge Valves operate independently—each controlling one section of the hangar. Should fire break out in any one area, that section will be instantly deluged with water from open sprinklers above and below—extinguishing the fire.

If you are displaying any of your planes or equipment in the Detroit Municipal Hangar, remember that the Hangar Deluge System is keeping silent, alert watch, ready to go into instant action if a fire starts.

Write for Bulletin No. 39—"The Answer to Fire Control Problems in Airplane Hangars," which gives you complete information on the Hanger Deluge System.

THE HANGAR DELUGE SYSTEM

OF OVERHEAD AND UNDERFEED SPRINKLERS

"Automatic" Sprinkler Corporation of America

Executive offices, Cleveland, Ohio *Offices in principal cities*

PAY AS YOU FLY... *in the world's most dependable light plane*

WHITTELSEY AVIAN

WHITTELSEY AVIAN...	$3845
DOWN PAYMENT.....	$1358
Balance Monthly Payments.	
HANDLEY PAGE WING SLOTS	$450

All prices F. O. B. Bridgeport, Conn.

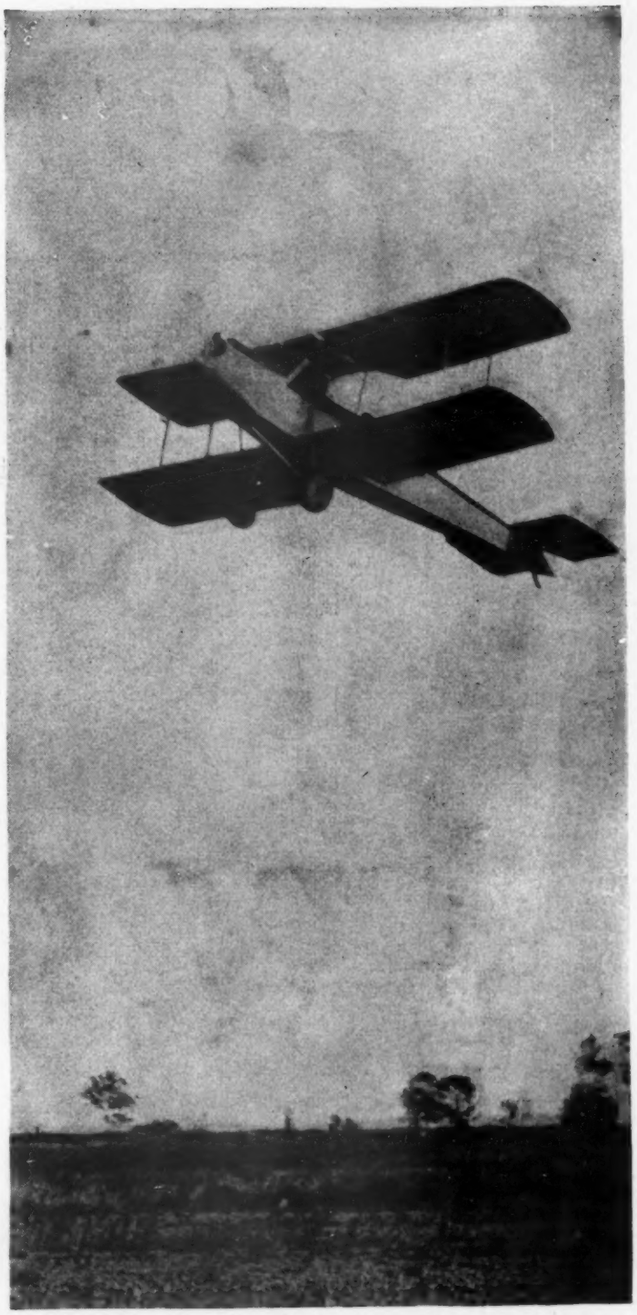
MANY thousands, who have never before been able to consider the purchase of a plane can now take up flying with a Whittelsey Avian. The price is down to only $3845. First payment is but $1358, and balance can be written off in easy monthly installments.

Quantity production has made this possible—quantity production and a plane that has been perfected and proved in every detail.

The Avian embodies all the latest safety features. Handley Page Wing Slots $450 extra, which eliminate danger of spins and permit lower landing speed! In the air the Avian's stability is phenomenal.

This plane can be operated economically for business or personal use and at the training school. 20 miles of travel for every gallon of gas in the Avian!

Pilots say that our plane is "safest to fly—easiest to land." Write now for complete details of the Avian—and the convenient purchase plan.

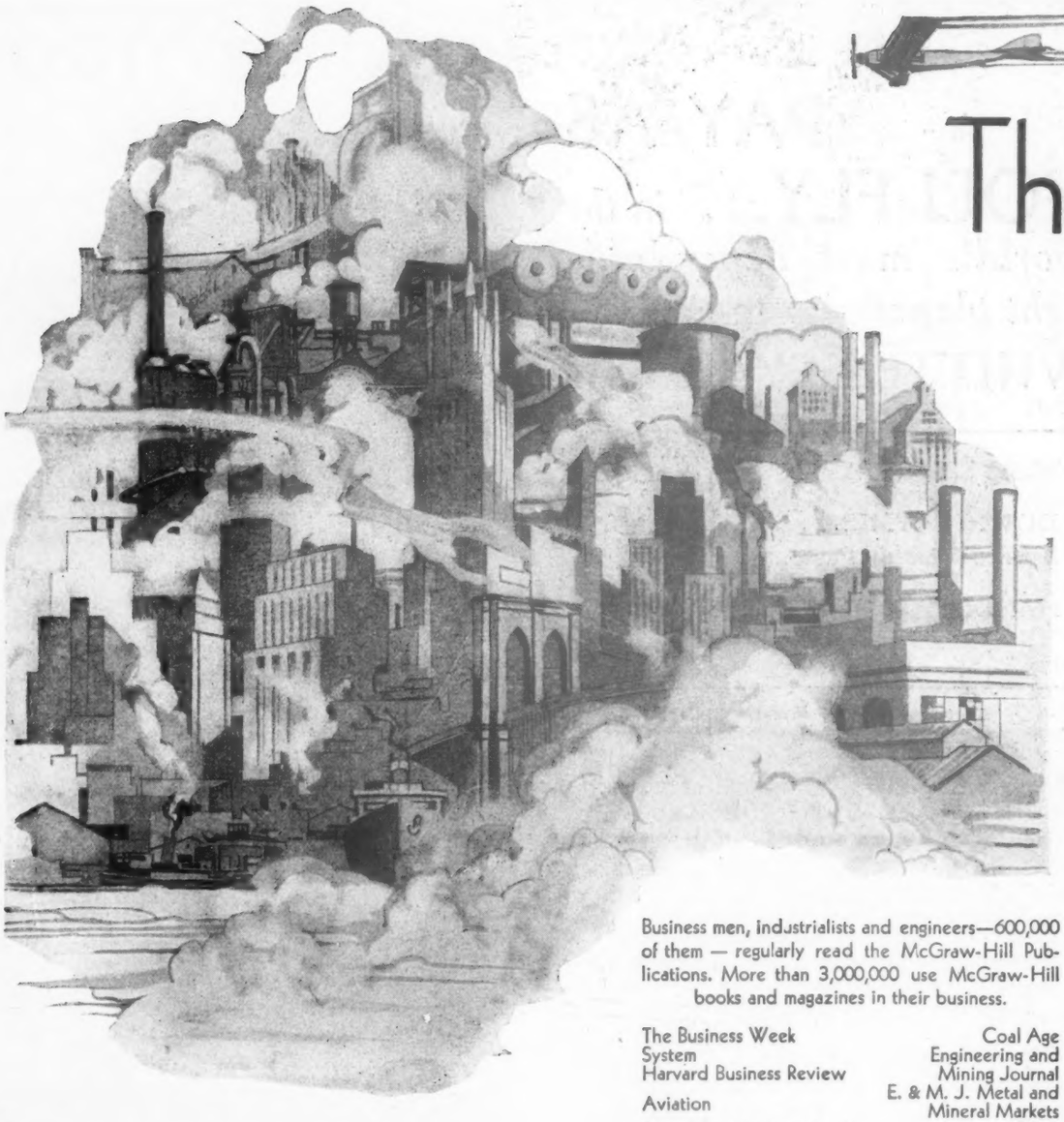


When you fly or sell the Whittelsey Avian you have something to talk about. No other light plane has such a record of performance....or the equipment. Dealers and distributors are still being appointed. Write for our sales plan and for full data and specifications of the plane itself. The Whittelsey Manufacturing Company, 225 Howard Avenue, Bridgeport, Conn.

WHITTELSEY AVIAN

IN AMERICA
WHITTELSEY AVIAN
AVIAN
IN ENGLAND

THE OUTSTANDING SPORT AND TRAINING PLANE OF THE WORLD



The

Business men, industrialists and engineers—600,000 of them — regularly read the McGraw-Hill Publications. More than 3,000,000 use McGraw-Hill books and magazines in their business.

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Harvard Business Review
Aviation
Factory and Industrial Management
Power
Industrial Engineering
American Machinist
Product Engineering
Bus Transportation
Electric Railway Journal
Food Industries
Coal Age
Engineering and Mining Journal
E. & M. J. Metal and Mineral Markets
Textile World
Electrical World
Electrical Merchandising
Electrical West
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Ingenieria Internacional*
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The American Automobile*
El Automovil Americano*
Engineering and Mining World

*Published by an associate company, Business Publishers International Corporation

McGRAW-HILL

McGRAW-HILL PUBLISHING CO., Inc., New York Chicago - Philadelphia - Washington

Plowman lifts his head

WITH bare hands, the plowman fought for his food. Hunger harried him . . . bent his back, bowed his head.

Then the machine . . . freedom . . . time to cultivate his fellows as well as his fields . . . to live, to think, to be.

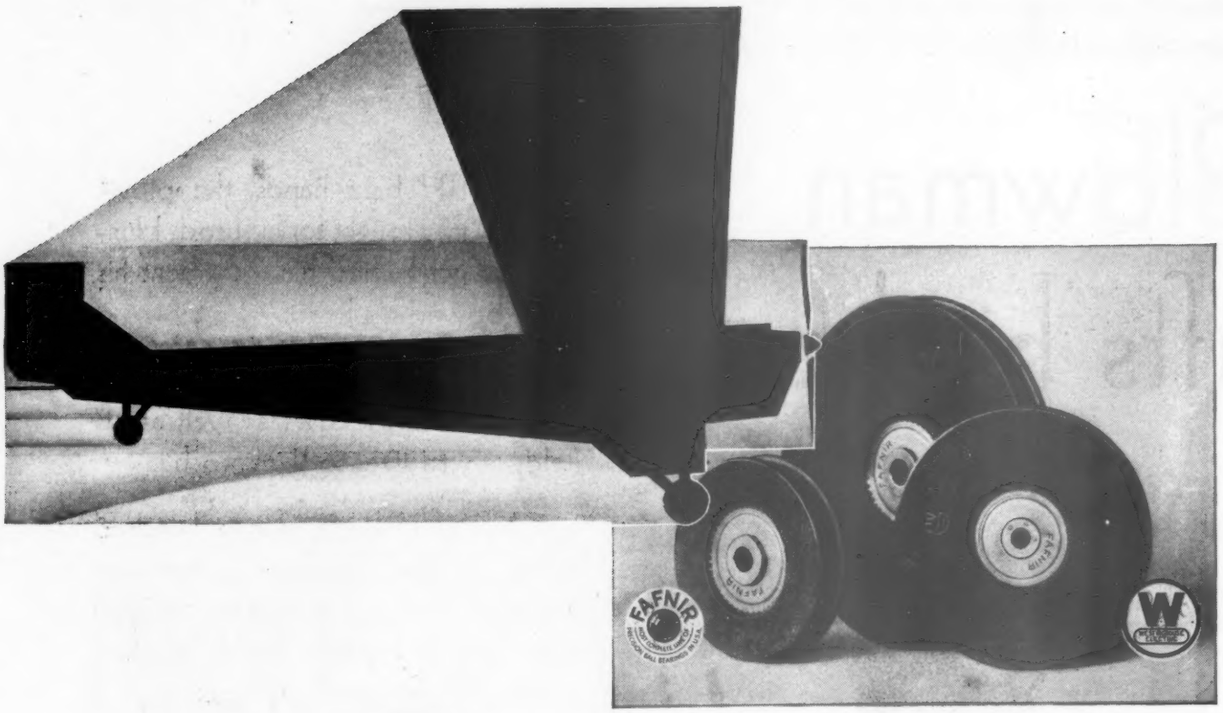
Industry gave every man a hundred hands . . . farms produced more with less men. Millions of workers flowed from farm to factory. Swiftly industry expanded, became complex.

As the pace grew faster there was a vital, growing need for the interchange of experience. Men of industry had to keep constantly informed of Industry's activities and progress . . . of the current news and developments in their own specialized fields. Out of these needs came the industrial press—the McGraw-Hill Publications.

Today 600,000 men of industry, the very men who lead, guide and operate the modern business world, read the McGraw-Hill Publications because they realize that they must read . . . or fall behind! They are paid in advance subscribers. Each has placed a cash value on the information that the McGraw-Hill Publications bring him.

PUBLICATIONS

Detroit - St. Louis - Cleveland - Los Angeles - San Francisco - Boston - Greenville - London



FAFNIRS *for* MICARTA Airplane Pulleys

TO "satisfy the most exacting requirements of strength, durability and low running friction," Westinghouse has produced this new control pulley. The Fafnir Double Seal Ball Bearings used are grease packed, require no further attention of any sort and produce a concentrically running pulley that assures uniform ease of response.

The double seal also prevents dirt from entering the bearing and protects the bearing from rust. And with all this Fafnir Double Seal Ball Bearings are the smallest and lightest pulley bearings made, and the only bearings making ball bearing pulleys interchangeable with Army-Navy No. 210 Standard graphitized bearing pulleys.

Fafnir Ball Bearings are made in types and sizes for every aircraft application. Aircraft Data Sheets give full information. They are yours for the asking.

THE FAFNIR BEARING CO., NEW BRITAIN, CONN.
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BALL BEARINGS

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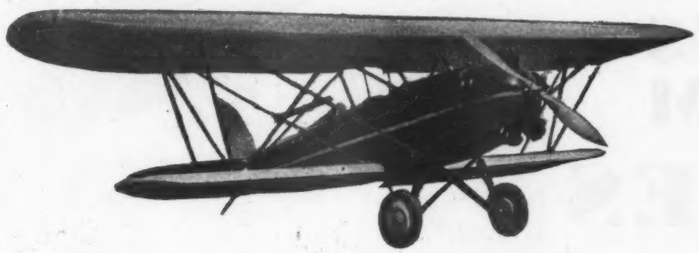

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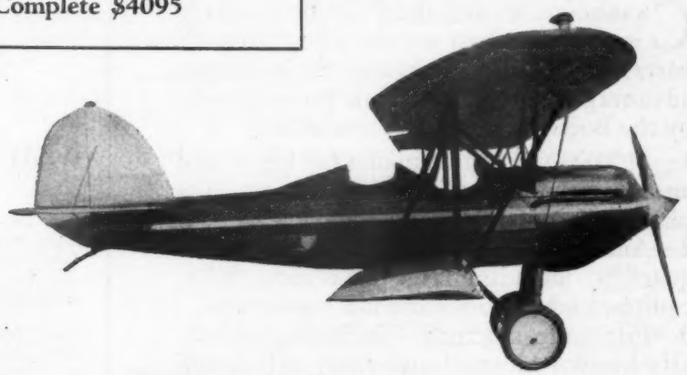

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We have a very attractive and profitable sales proposition to offer. Write for full details, factory co-operation, etc.

"BIRD" PRICES REDUCED

Name the ship, with the same horsepower, that can compare with the "Bird" in performance, stability, construction, and appearance.

"ASK THE PILOT WHO FLIES ONE"

BIRD

BRUNNER WINKLE AIRCRAFT CORPORATION

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WHY BOEING STUDENTS COME FROM 22 STATES

CAREER-PILOTS and the aviation mechanics of tomorrow are enrolling from all parts of the United States for these definite advantages, offered all in one training only by the Boeing School of Aeronautics:

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Mail the coupon below or write us about your plans for an aeronautical career at America's Leading Flying School.

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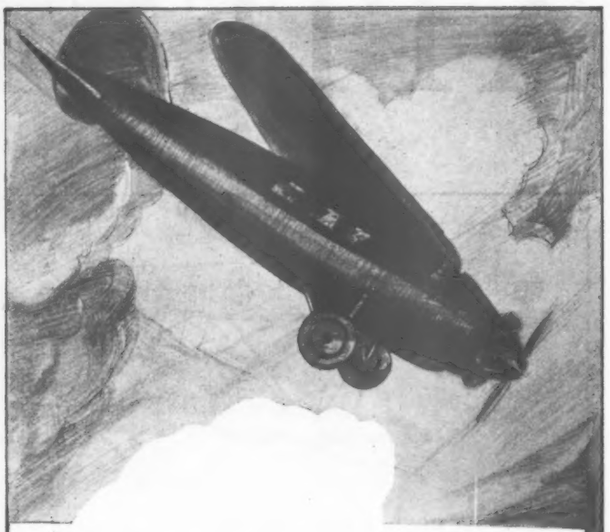

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They look their part—comfortable, fire-proof, safe, attractive. Every Maryland Metal Hangar or Airport Building is covered with standard interlocking sections of Lyonore Metal, the corrosion resisting alloy—is built "Standard" to save you weeks of erection time and costly labor. Maryland Metal Airport Buildings offer the lowest cost per square foot of floor space of all types of permanent building construction.

This booklet is free—it shows the many designs of hangars and other airport buildings available in standard sizes—at standard prices. Get your copy to-day.

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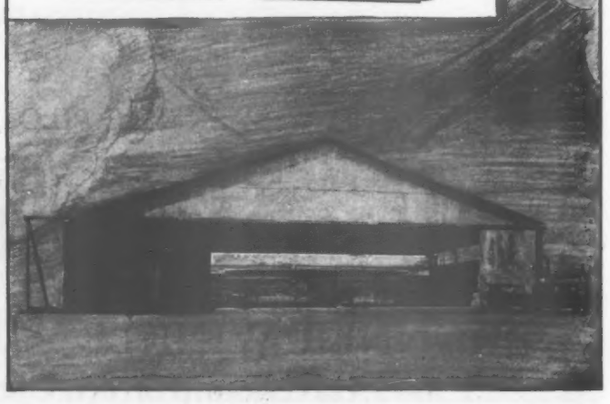


- - - and **NOW,** *another leading oil company is*

"GOING BOEING"

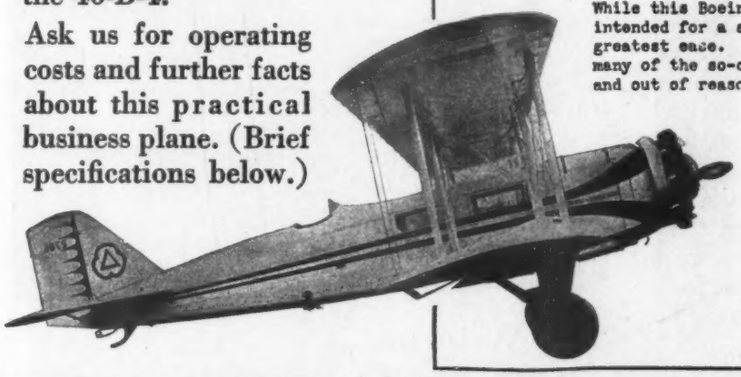
First, the Associated Oil Company.

Then, the Standard Oil Co. of California.

And now, the Empire Oil and Refining Co., subsidiary of Cities Service Company, has purchased a Boeing 40-B-4.

FOR the same reason that 50% of the nation's air mail is flown in Boeing planes . . . that's why these oil companies, and other progressive firms, are selecting the 40-B-4.

Ask us for operating costs and further facts about this practical business plane. (Brief specifications below.)



THE EMPIRE COMPANIES

BARTLESVILLE, OKLA.

December 14, 1929

Boeing Airplane Company,
Seattle, Wash.

Gentlemen: Attention of Mr. Erik H. Nelson, Sales Mgr.

Just five months ago, the Empire Oil and Refining Co., subsidiary of Cities Service Company, purchased one of your 40-B-4 planes for commercial use.

The maiden trip of this "Cities-Service-Empire" Boeing from Seattle to Bartlesville, Oklahoma, or almost 2000 miles, was made without the slightest trouble of any kind.

The impression of the ruggedness of construction gained during the three weeks' visit to your factory, prior to delivery, have been borne out during the few months we have been operating this plane.

While this Boeing was built for commercial use and was not intended for a stunting ship, it can be maneuvered with the greatest ease. Its performance compares favorably with many of the so-called "sport" planes. It can be taken in and out of reasonably small fields with full load, and it lands without the slightest rumble or jar. The beauty and performance of our Boeing bring favorable comments everywhere we go.

Yours very truly,
EMPIRE OIL AND REFINING COMPANY
AVIATION DIVISION
By Virgil D. Stone
Pilot

BOEING AIRPLANE COMPANY

Division of United Aircraft & Transport Corporation

SEATTLE, WASHINGTON

[In Canada: Boeing Aircraft of Canada, Ltd., Vancouver, B. C.]

PERFORMANCE

(Boeing Model 40-B-4 with full load)

Speed: High speed 138 m.p.h.; cruising speed 115 m.p.h. Ample reserve power. Cruises 4½ hrs. without refueling.
Quick Take-off; Slow Landing: Takes off in 12 seconds after 550 ft. run. Lands at 57 m.p.h.
Power Plant: 1 Pratt & Whitney 525 H.P. "Hornet" engine.
Actual Pay Load: 4 passengers, mail, and baggage (1163 lbs.)
Night Flying Equipment: Instrument board lights. Parachute flares and retractable landing lights.
Radio Equipped: Bonded, shielded, and wired throughout.
Fabric Covering: Permits speedy, economical, accurate inspection—a safety factor.
Completely Equipped: No extras to buy, no weight to add.
Special Features: Noise-proofed and insulated cabin. Oil cooler with shutter control operated from cockpit. Wheel brakes hand-operated. Adjustable pilot's seat and rudder bar pedals. Electric inertia starter.

Passenger comfort requires interior decoration in aeroplane cabins. Progressive manufacturers specify "Aerovel" mohair fabrics for "added attractiveness in cabin plane interiors."

Samples and prices upon request.

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WATER is the sure road to dealer-success in aviation. *Water* is the landing field that inspires confidence. On the *water*, you will find men to whom ownership of this three-place Savoia amphibian, comes as a simple, logical step. Easy to pilot as a speed-boat, yet "stable as a pyramid". Discussion of dealer-terms invited. American Aeronautical Corp., 730 Fifth Avenue, New York.

▲ During the All-American Aircraft Show, Detroit, April 5 to 12, Savoias will be exhibited on the floor and available for demonstration-trips at the Detroit and Grosse Pointe Yacht Clubs.

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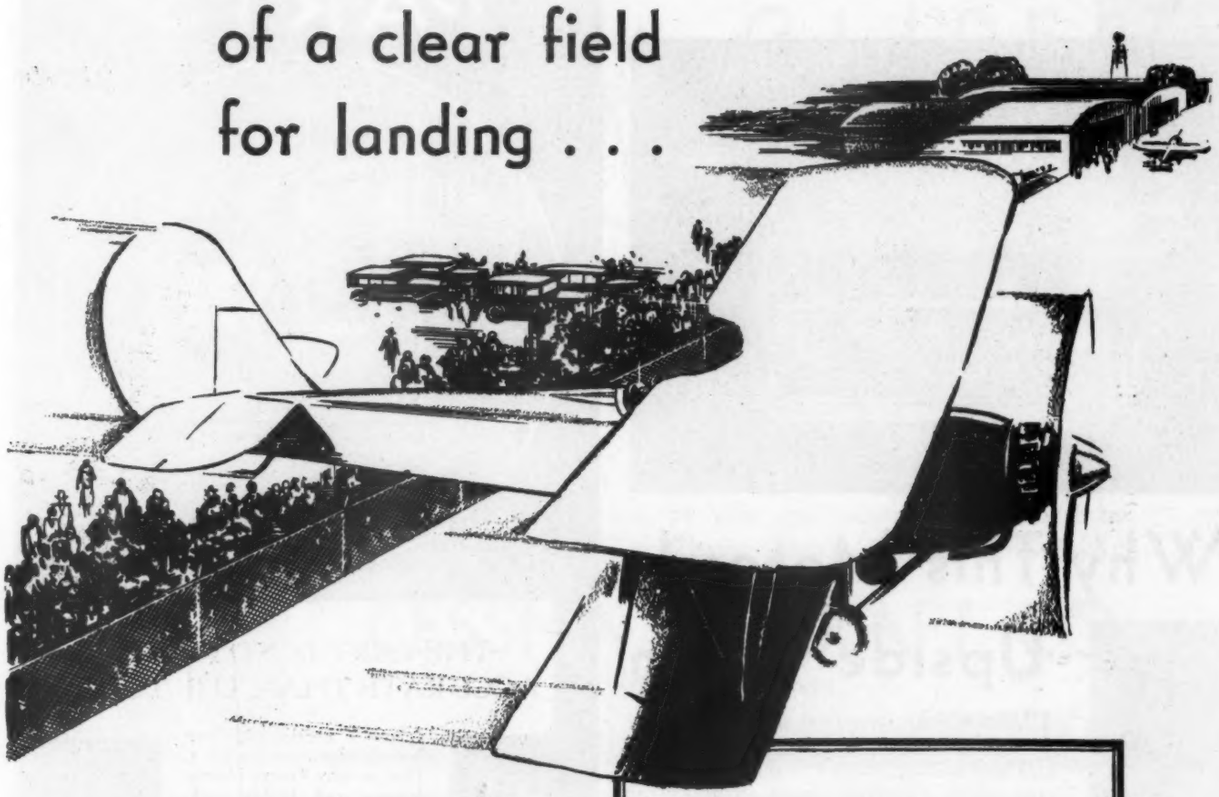
SEA PLANES ▲ AMPHIBIANS

Competent pilots give flying boat and amphibian instruction, at New York Seaplane Airport, Port Washington, L. I.

CONFIDENT . . .

of a clear field for landing . . .



PITTSBURGH CHAIN-LINK FENCE is ideally suited to airport enclosures. It affords no toe-hold for climbing, is sturdily built to resist the pressure of crowds, and will perform its job under the most severe tests. Pittsburgh Chain-Link Fence is good-looking, and offers an unobstructed view for legitimate on-lookers.

Made of the finest copper-bearing, basic open hearth copper bearing steel, and hot zinc-coated after weaving with a smooth, extra-heavy and well-bonded coating of pure zinc, Pittsburgh Chain-Link Fence is designed to retain its shape and appearance and weather the years with a minimum of maintenance.

Make your airport safe for visiting pilots and it will become a popular port of call.

When crowds are held in control by proper fencing of the airport, pilots can approach the field with complete confidence that it will be clear

Erection service is available any place. Write for specifications and descriptive literature.

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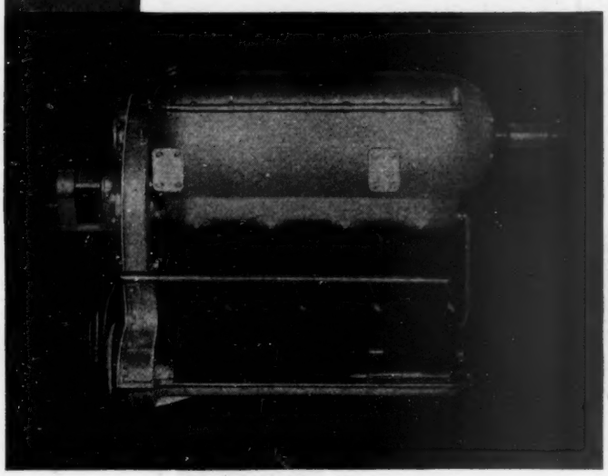
CHAIN-LINK TYPE

Upside Down Is Right Side Up!
LOUIS CHEVROLET



Why This Motor Is Upside Down

FAMOUS for over two decades as a designer, builder and driver of commercial and racing motors, Louis Chevrolet now offers a revolutionary advancement in aircraft motor design—the *inverted*, 4-in-line, aircooled Chevrolet D-333.

The unique "upside down" construction results in greater visibility, higher propellor clearance and adaptability to clean stream-lining. *Plus* a new standard of dependability, due to three unusual features:

(1) BETTER COOLING; the cylinder head is under the nose of the ship. (2) LONGER VALVE LIFE; stems, guides, springs, lifter cups and cam shafts are flooded with oil, keeping them at even temperature and greatly lessening wear. (3) BETTER AVERAGE WORKING TEMPERATURES; exhaust ports are under the cylinder head, giving easier passage for cooling air from the side scoop.

Write for descriptive literature, giving further information and specifications.

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THE PART IS NO MORE ACCURATE THAN THE TOOL

ONLY precise tools can produce precise parts. That is why Govro-Nelson designs and builds complete in its own shops, all jigs and fixtures used in the manufacture of aircraft parts. To further assure the necessary accuracy, Govro-Nelson designs and builds the most precise inspection gauges that constantly check the exactness of the machines and their products.

The machine pictured above is a Zip Swiss Jig Borer, recently imported from Switzerland by Govro-Nelson. It produces jigs and fixtures with extreme accuracy.

GOVRO NELSON COMPANY
1931 ANTOINETTE - DETROIT

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MONOPLANE CESSNA GLIDER

A Glider that is more than an experiment or toy . . a Glider that has been proven by actual test flights under all conditions before being placed on the market. . . . . .

If you want to learn to fly, or if you want an active dealership in a profitable business, be wise and secure only the best by investing in a Monoplane Cessna Glider. *Crated Complete With Launching Equipment* $398 *F. O. B. Wichita*

CESSNA AIRCRAFT CO.

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DeLuxe 102
Heavy Sterling Silver Tag with Yellow Gold Filled Wings or Silver Wings, with Sterling Chain $7.00
With Non-tarnishable White Metal Chain.. 5.00

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Same, except Gold Filled Wings and Sterling Tag.. 5.00

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Solid 10K Yellow Gold Ring....15.00
When ordering rings, give finger size.

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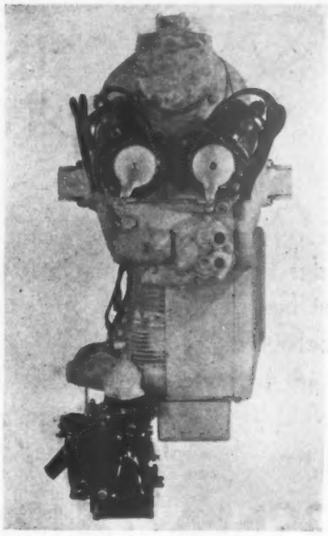
—AVIATION— ROVER —ENGINE—

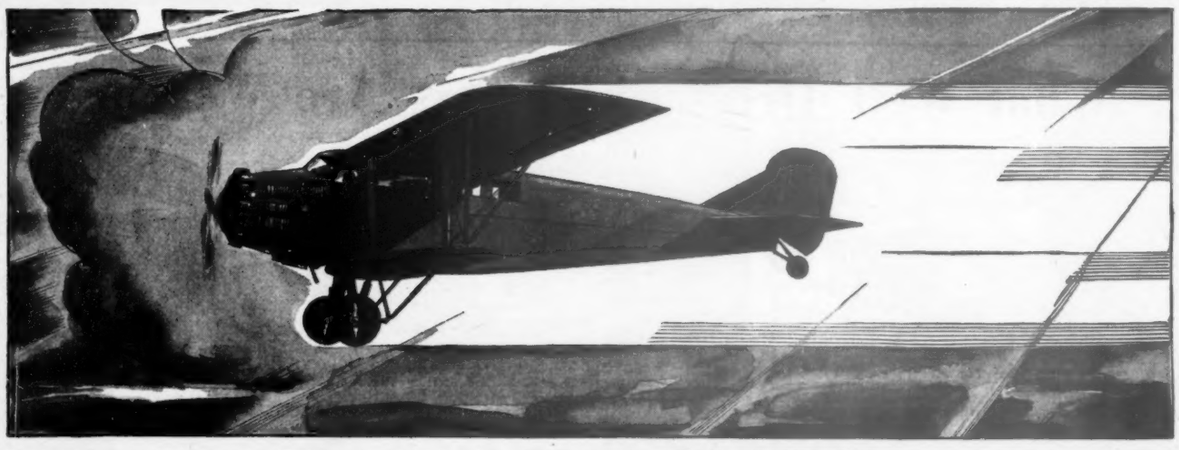
The original "INVERTED" four cylinder in-line air cooled engine
Approved type certificate No. 37

Bore .....4.125″
Stroke .....5.000″
Total Disp. .....267.28 cu.in.
Comp. Ratio 5.10:1
Normal H.P. (Dept. of Commerce rating) 75 @ 1975 R.P.M.
Five-bearing crankshaft
Dural connecting rods
Aluminum pistons
Aluminum Alloy Cylinder Heads
Enclosed Valve gear
Dual "Scintilla" ignition
Stromberg Carburetor
Weight complete with hub, exhaust system, air scoop and carburetor air heater 232 lb.



We extend to you a very cordial invitation to compare this latest "Rover" engine with any other in its horse power class by actual trial during the All-American aircraft show. Arrangements may be made either at the airport or our exhibit.

Manufactured by
THE MICHIGAN AERO-ENGINE CORPORATION, Lansing, Mich.



A BUHL PLANE IS IN THE SKY

On the ground, those who ordered it aloft dismiss it from their minds. Proven records are their guarantee that its mission will be accomplished swiftly, safely, surely. And those who fly rest comfortably in its cabin, secure in the knowledge that expert engineering and design and splendid craftsmanship safeguard their passage.

The Buhl Standard Air Sedan (illustrated) is a six-place, dual-control plane, priced at $13,500 with the J-6 Wright Whirlwind engine. The Buhl Senior Airsedan is an eight-place dual-control plane, priced at $18,500 with the Wasp engine and $19,500 with the Hornet or Cyclone. The Buhl Sport Airsedan is a three-place dual-control plane, priced at $12,000 with J-6 Wright Whirlwind engine and $11,000 with the J-5.

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SENIOR · STANDARD · SPORT

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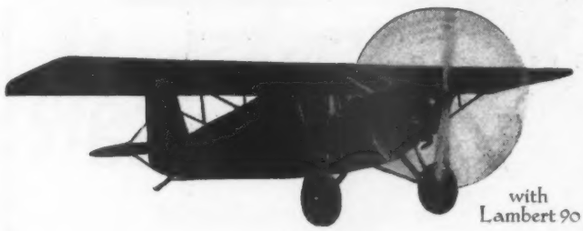

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A two place (side-by-side) cabin monoplane with big ship performance and refinements.

DESIGNED AND BUILT PRIMARILY FOR THE AMATEUR PILOT, FLYING SALESMAN, SPORTSMAN, FLYING SCHOOL, FLYING CLUB

Powered with Lambert 90 or Genet 87 complete with instruments, brakes, hydraulic landing gear. Flyaway factory, $3450.

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Top Speed ..... 120 mph. Landing Speed ..... 35 mph.
Cruising Speed .... 100 mph. Fuel Consumption . 5 gal. ph.
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The big market just around the corner for the small, well designed, well built airplane, is realized by forward looking dealers with whom correspondence is invited.

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Where there is no landing there must be no failure.

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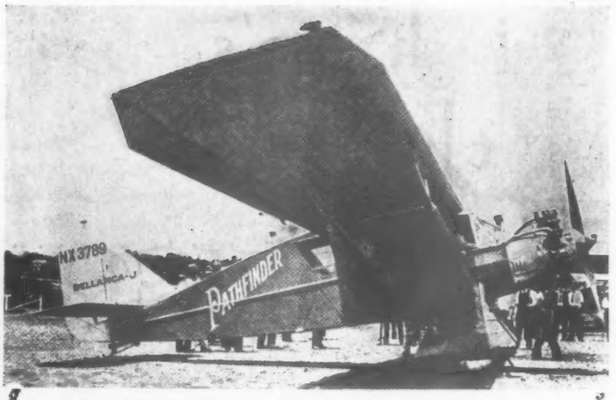

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Brace every plane you build or fly with

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Plywood, Birch or Mahogany, and size 2, 3 or 4 feet wide by 4, 5, 6 or 7 ft. long—1/16-in., 3/32-in. or ⅛-in. per sq. ft. (Small crating charge on plywood).	.32	Thimbles, each	.02
		Safety Belt, 5-in., 41-in. long, each	4.00
Turnbuckles, 324 SM, 324 SF, 325 SF, 325 SM, 326 SF, each	.35	Safety Belt, 3-in., 41-in. long, each	3.00
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⅛-in. Control Wire, per ft.	.07½	Straight Needles, 12-in.—$.15; 16-in.	.20
3/32-in. Control Wire, per ft.	.08	Curved Needles, 3, 4 or 5-in., each	.10
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Commercial Fabric, 36-in., yd.	.35	Aluminum Powder, per lb.	1.00
26x4 Tires, each	5.50	26x4 Clincher Wheels, each	11.00
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Aluminum, 26 gauge, 18x72 sheets	1.25	Shock Cord, ⅝-in., per foot	.26
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An Air-Rail-Water Highway Terminal of Austin Design

AUSTIN

The new

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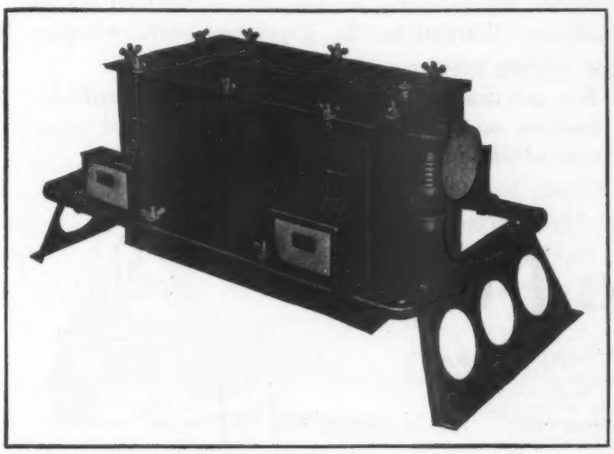
AIRCRAFT BEACON AND WEATHER RECEIVER



RCA
AIRCRAFT
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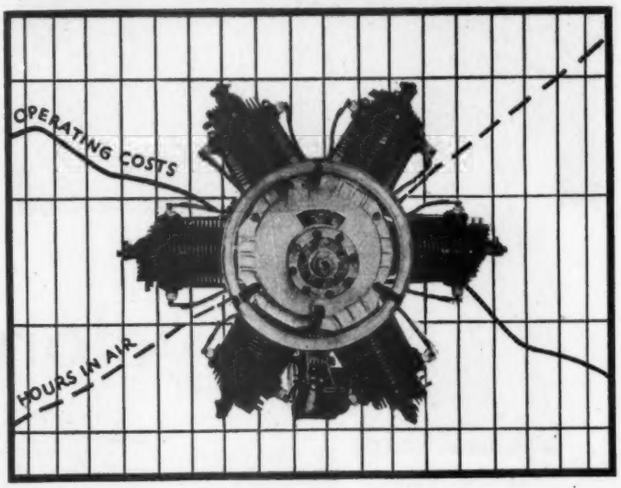

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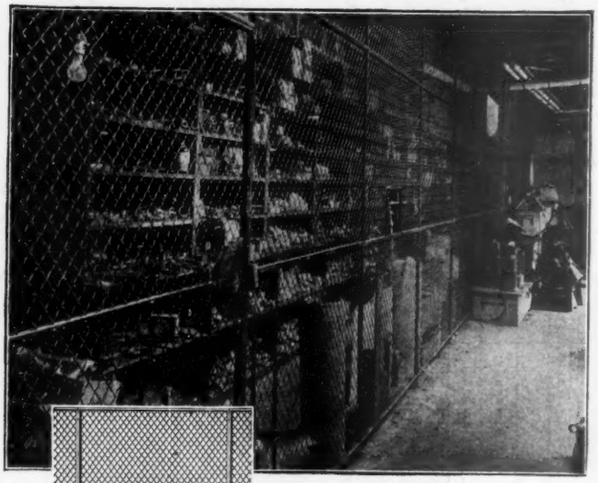

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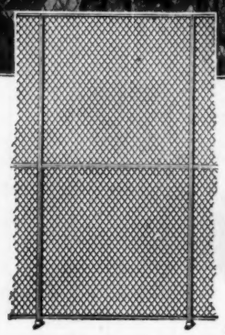

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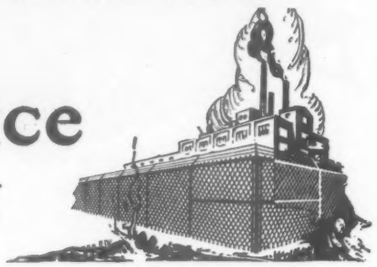

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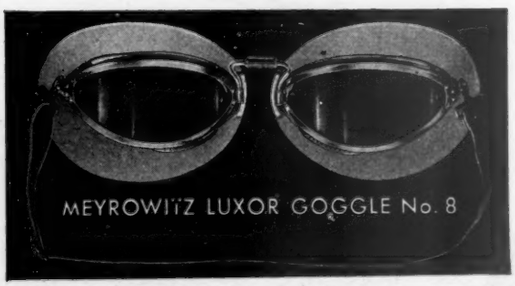

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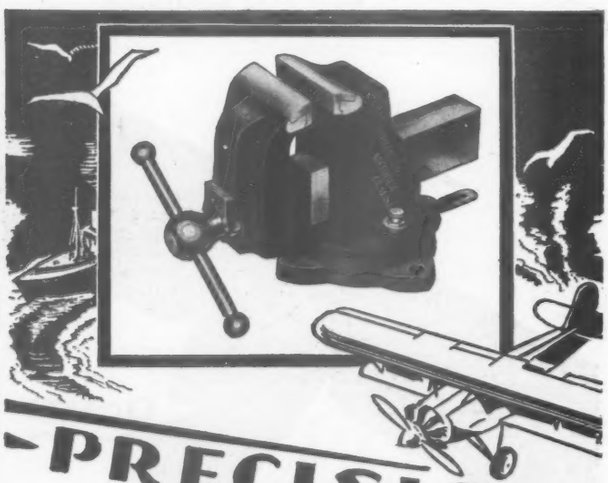

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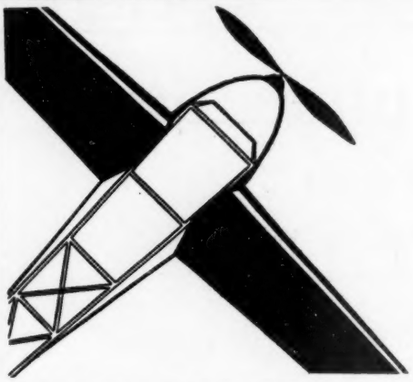

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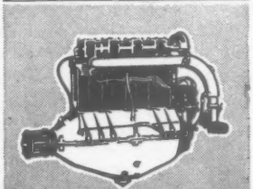

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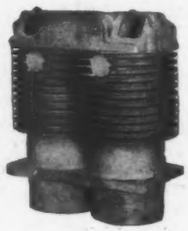

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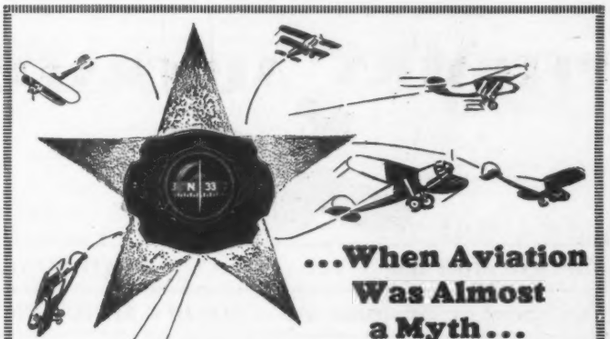

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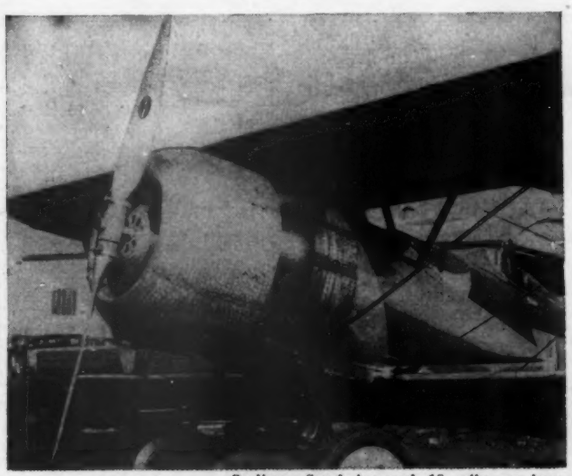

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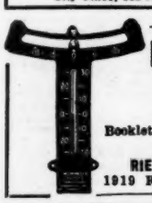
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CASH needed, brand new Arrow Sport, Leblond "60," in perfect condition, never been used, $2,300 for quick sale. Telephone Hugh Rockwell, Freeport, N. Y. 4853.

CONVERTED Jenny, with new Allison monoplane wings, wings never been used, built last year, equipped with one hundred ten h.p. Anzani motor, $1,050. J. Thomas, 111 Burke Ave., Linoleumville, S. I., N. Y.

CURTISS MF flying boat for sale; completely rebuilt, reconditioned and licensed (C73). Flyaway. New Haven Air Terminal, Inc., P. O. Box 919, New Haven, Conn.

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FOR SALE

FOR SALE—Must dispose for financial reasons, Hisso E, A-1 condition, propeller, radiator, motor-mount and all fittings. First reasonable offer taken. FS-464, Aviation, Tenth Ave. at 36th St., New York.

FOR SALE: Four new OXX-6 motors. David M. Lane, Towanda, Pa.

FOR SALE: At sacrifice, new 40 hp. Salmson radial motor never removed from original box. FS-476, Aviation, Tenth Ave. at 36th St., New York.

FOR SALE: Two new Biplanes, two passenger side by side, dual controls, Velie motors, not licensed, built by one of the best engineers in this part of the country. Must sell as the corporation has dissolved. Bargains for someone. Swinson Motor Company, Pratt, Kansas.

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FOR SALE: Stinson J-5, Junior, 4-place; Heywood starter. Ship and motor same as new. Privately owned. Licensed N.C. 8427, August first, 1929. Will accept Waco Whirlwind or OX on this. Price very attractive. J. W. Shattuck, 207 No. Dewey Street, Owosso, Mich.

FOR SALE

FOR SALE: Upper left wing, Travel Air 2,000, $100. W. A. Flowers, Pyote, Tex.

FOR SALE: 2 Ryan monoplanes with Wright engines, $5,000 each; 1 Cessna Wright engine, $4,000; travel Air with Halske engine, $2,500, Eaglerock OX-5, $1,000; 2 Isotta-Franchini, 350 hp. motors, $300 each; 4 OX-5 motors, $250; 1 Curtiss C-6 with Reed propeller, $350; lot of other miscellaneous equipment, including 2 new Micardi propellers for Wright J-5; 3 parachutes, etc., at lowest prices. All the above airplanes in good condition. Will sell complete our entire airplane equipment for $18,000. Mayer Aircraft Corporation, Bridgeville, Pa.

FOR SALE: Cessna monoplane in excellent condition. Motor has had only 10 hours. Price $3,200. Vic. Staatz, Herington, Kan.

FOR SALE: OX-5, Eaglerock, combination wing, like new, licensed and always kept in hangar, will instruct buyer. W. J. Fritschle, 2205 Richert, St. Louis, Mo.

FOR SALE: Four brand new Curtiss Hammondsport OX-5 motors, complete in every respect. Attractive price. J. A. Field, 112 Boylston St., Bradford, Pa.

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(Continued on the following page)

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FOR SALE

(Continued from preceding page)

FOR SALE: OX-5 Curtis Robin, 140 hours on ship, 30 on motor, turns 1,440 on ground, 1,650 in air. Like new $2,500, will take open ship in trade. Harry Deuter Garage, 318 W. Washington Blvd., Ft. Wayne, Ind.

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FOR SALE—American Eagle, parts, fuselage, upper wings, tail group, radiator, nose plate, landing gears and tires, wing struts. Robert Long, Harrison City, Penna.

FOR SALE—Waco Ten Curtiss OX5 motor, Miller valve action, N. C. license, total time 120 hours, oversize tires and wheels, double centersection tanks; excellent condition, new oleos; price $1,800; ship at Tampa Airport. Harry L. Land, Bradenton, Fla.

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Aviation

Tenth Ave. at 36th St., New York City

FOR SALE

FOR SALE—One Stinson-Detroiter, 6 passenger, whirlwind motored, equipped for night flying; one Waco Ten OX5, equipped for night flying; also shop, office equipment and spares; wire or write. Wayne Flying Services, Ft. Wayne, Ind.

FOR SALE—Standard J1, completely gone over; fine shape, newly recovered doped orange wings, block fuselage, LS5 landing gear, complete instruments, dual control, 180 Hisso completely overhauled, Hamilton prop., complete, $750; take auto part payment. O. H. Kerr, Maine Hotel, Okmulgee, Okla.

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OXX-6 Curtiss motors guaranteed brand new. Also few government rebuilt OX-5 and OXX-5 motors. Prices reasonable. Motors shipped with privilege of inspection. Grant Marine Motor Co., 10439 Shoemaker Ave., Detroit, Mich.

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RYAN Brougham in good condition, motor recently overhauled. Bargain price. Cleveland Pneumatic Tool Co., Cleveland, Ohio.

TRAVEL Air OXX6. Scintilla mags, booster starter, Pioneer compass, Miller overhead, D. H. wheels, oil heat gauge, dual controls, price $2,000. R. L. Duckworth, 736 Cecil Ave., Louisville, Kentucky.

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NC 6466	Travel Air Hisso "A"	3000
NC 509E	American Eagle OX5	1350
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NC 3068	Arrow Sport LeBlond 60	2500
NC 9823	Travel Air Warner 110	3500
4253	Wallace 2-pl. cabin monoplane Anzani 120	1275
NC 593H	American Eagle biplane OX5	1575
NC 588H	American Eagle biplane Kinner	2450
NC 4341	Waco 10 biplane OX5	1450
NC 7662	American Eagle biplane OX5	1350
NC 590H	Wallace Touraplane 3 place Kinner	3975
NC 3969	American Eagle biplane OX5	1100

The power plants of these planes have been serviced in our factory motor department and are like new. Fabric and paint jobs are in excellent condition. Terms can be arranged on some of these ships.

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The American Eagle Aircraft Corporation

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All ships licensed and guaranteed.

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1—Sixty Velie, 1—OXX6 Curtiss.
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FOR SALE

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CHALLENGER or J-6 Robin wanted. Must be in first-class condition. Want to trade Command Aire-Warner if possible. Give full information in first letter. Jefferson Airways, Inc., Jefferson City, Mo.

WANTED: Landing gear for Hisso, Waco 180. M. J. Hunter, 177 So. Front, Memphis, Tenn.

WANTED: Used three cylinder Anzani, complete or other light motor for Lincoln sport plane. Motor must be in good running condition and cheap for cash. Address MMG., 722 Broadway, Webb City, Mo.

WANTED OX-5 motors used, or incomplete, etc., also upper crankcase, propellers, new Harding exhibition parachute, $55. Hisso-A, perfect, cash or light car. Jenney complete, less motor, all new covering, no crackups, $375, time payments. Baarley Brothers, Ellsworth, Wisconsin.

WANTED: New and used OX-5 motors. Box 37, Freeman, S. D.

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PW-487, Aviation
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0301

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He has traveled widely and is particularly well acquainted in Detroit, Chicago, Wichita, Toledo, and Milwaukee. His references are prominent business men who can testify to his result getting ability. Available April 1st when an interview with established firms will be appreciated.

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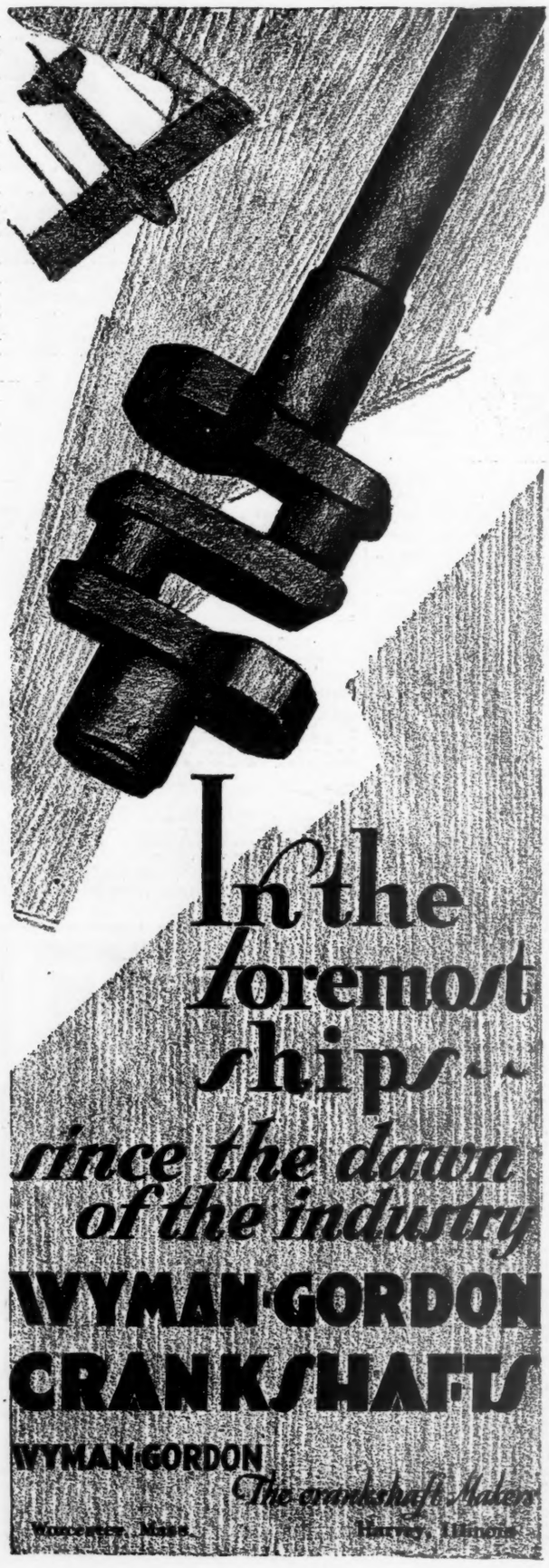

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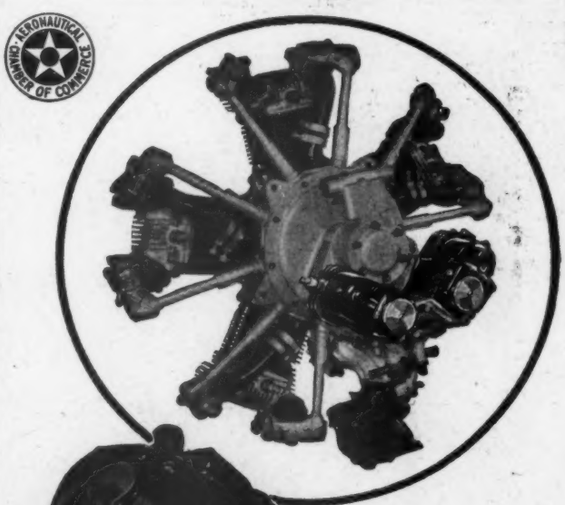
SCINTILLA
AIRCRAFT MAGNETOS

Help Make Altitude Record

Piloting a Barling NB-3 plane to a height of over 27,000 feet, at the recent St. Louis Show, D. S. Zimmerley brought the altitude record for light airplanes back to America. At the same time he forged another link in the long chain of successful flights made by planes equipped with Scintilla Aircraft Magnetos.

These magnetos are obtainable for engines of from one to eighteen cylinders.

SCINTILLA MAGNETO CO. INC.
SIDNEY - NEW YORK
Contractors to the U.S. Army and Navy
(Division of Bendix Aviation Corporation)



Scintilla Magnetos on the Lambert 90—the engine used in the Barling NB-3 light airplane in its record breaking altitude flight.

DEPENDABILITY
SIMPLICITY
ACCESSIBILITY

A FUTURE

"Capitol of Aeronautics"

IN THE MAKING

EVERY BRANCH of aeronautics is provided for in the plans for the new Glenn L. Martin airport and plant now taking form at Middle River, on the outskirts of Baltimore. There will be laboratories for the engineer, shops for the artisan, a school for the student with courses covering both design and flying, a residence colony with hydroplane landing for the amateur, and a hotel, restaurant and camp for interested visitors.

The* GLENN L. MARTIN *Co.
Builders of Quality Aircraft since 1909
BALTIMORE, MARYLAND

AVIATION
April 5, 1930

BLIND FLYING

Thanks to the instruments which have been created by Pioneer engineers, it is now possible to fly an airplane "blind" through fog or cloud, by day or night, for an indefinite length of time, and without undue effort or mental strain. Blind flying requires training and practice, but with the help of Pioneer instruments it can be done by any pilot. The essential instruments are the Bank and Turn Indicator and the Climb Indicator. Both were *created* by the Pioneer engineering organization—and both are fully covered by Pioneer patents.

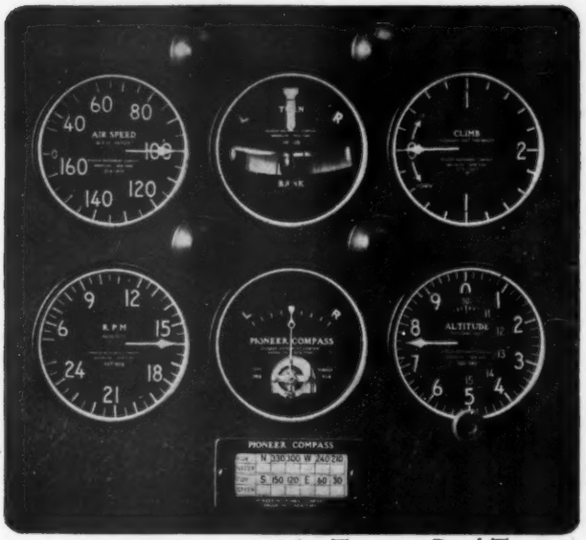
Another outstanding creation of Pioneer engineers is the Earth Inductor Compass, which has been used with such success by Lindbergh, Byrd, Chamberlin, Kingsford-Smith, and so many other famous pilots.

Of hardly less importance are the developments and improvements made by Pioneer engineers in the older aircraft instruments:

Remember the old clumsy flat-card compass? Pioneer engineers developed the side-reading Pioneer compass, which is available in types to suit every airplane and is now the American standard. It is small, compact, accurate and thoroughly satisfactory. And in it compass compensation has been revolutionized by the Titterington Micrometer Compensator.

Not so long ago tachometers were used to help guess how fast the engine was running. Then Pioneer engineers created a new centrifugal tachometer which is accurate to 10 r. p. m.—and holds its accuracy. And it is steady, even when driven by unusually long lengths of flexible shafting.

Similarly the old unreliable pitot-venturi type air speed indicator has given way to the pitot-static type which operates



Air Transport Panel Type 520

accurately from any one of a series of interchangeable pitot-static tubes made to suit all sorts of installation requirements—thanks largely to Pioneer engineers who solved the problems which made this possible. For 100% operation, even when ice is forming on the wings, the Pioneer electrically heated pitot-static tube is used by air transport lines.

By the reduction of "lag" almost to the vanishing point, as a result of years of research and experiment, Pioneer engineers created altimeters far more accurate and dependable than any previously available. The newest, as used in the Transport Panel, has provision for rotating the mechanism as well as the dial, so that the hand may be kept horizontal at any altitude and the instrument used as a level flight indicator.

The Pioneer Engineering Department does more than merely meet the needs of aviation as they are presented. Pioneer engineers are always at work on new devices which the aircraft industry is going to need—two, three, and even five years from now. The Pioneer engineering and research organization is your assurance that the Pioneer instruments you buy today are the best it is possible to produce—and your promise that next year's instruments shall be even better.

—PI—

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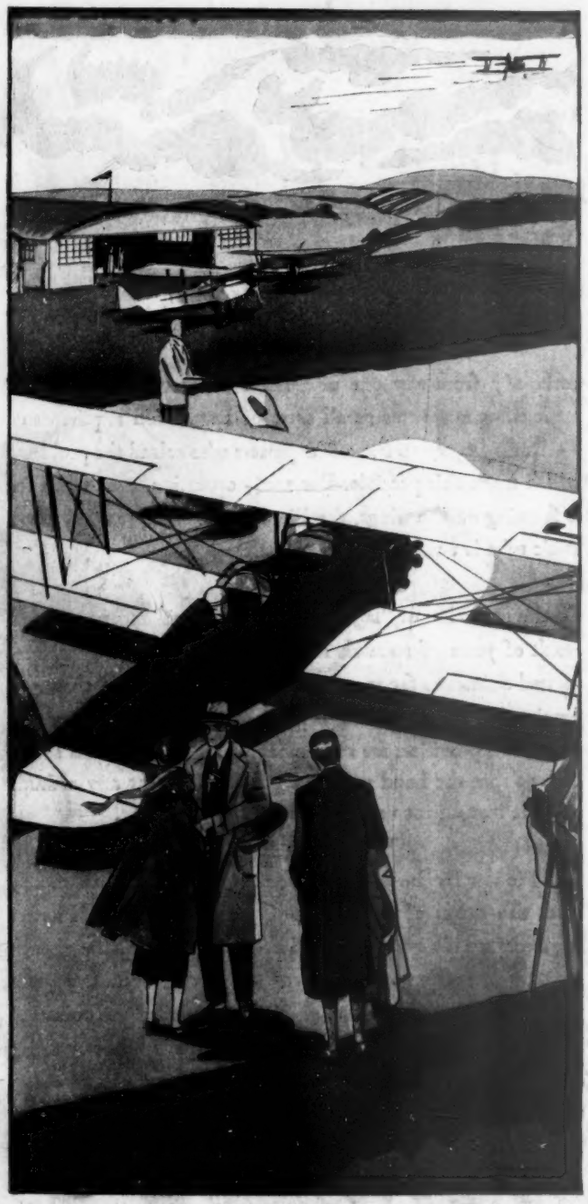

ASSEMBLED, tested . . . torn down, inspected . . . re-assembled and re-tested—each "Whirlwind" and "Cyclone" is proved before it leaves the plant. Yet here Wright's interest has only begun.

For Wright Service follows the engines wherever they fly! A chain of eighty-eight airport Service plants stretches across America. And the Wright owner, through these plants, keeps his Wright engine working as smoothly on the 2000th hour that he runs as he did on the day he got it.

This network is the result of steady growth under Wright's plan of keeping Service in step with advancing sales. It gives Wright engines the kind of painstaking attention and care that their fine workmanship deserves. It gives Wright owners factory service wherever they fly their motors.

And it does this at not unreasonable cost. For with 94 percent of all Wright parts fashioned at the factory to fit all three "Whirlwind" models alike, Wright service cuts costs without cutting corners.

And this, as much as any one thing, is the reason why Wright "Whirlwinds" many times have shown 150,000 . . . 200,000 . . . and more swift, dependable miles of flight in their remarkably long lives!

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